Arab Republic of Egypt
Ministry of Education
Book Sector

Science & you

LEARN AND INNOVATE

Sixth Primary

6

غير مصرح بتداول هذا الكتاب
خارج وزارة التربية والتعليم

Student's Book

Second Term

2015 - 2016

Science & you

LEARN AND INNOVATE

LEARNING

SCIENCE OPENS A WINDOW
OF DIFFERENT KNOWLEDGE FOR THE MIND
THIS BOOK AIMS TO APPLY ALL WHAT THE STUDENT
LEARNS IN DAILY LIEEI AN ACT WHICH IS REFLGCTGD ON
HIS DERFORMANCE WAY OF THINKING AND, HOW TO DEAL
WITH SOLID ISSLID AND PROBLEMS.

الشروق
الحديثة للطباعة والتغليف

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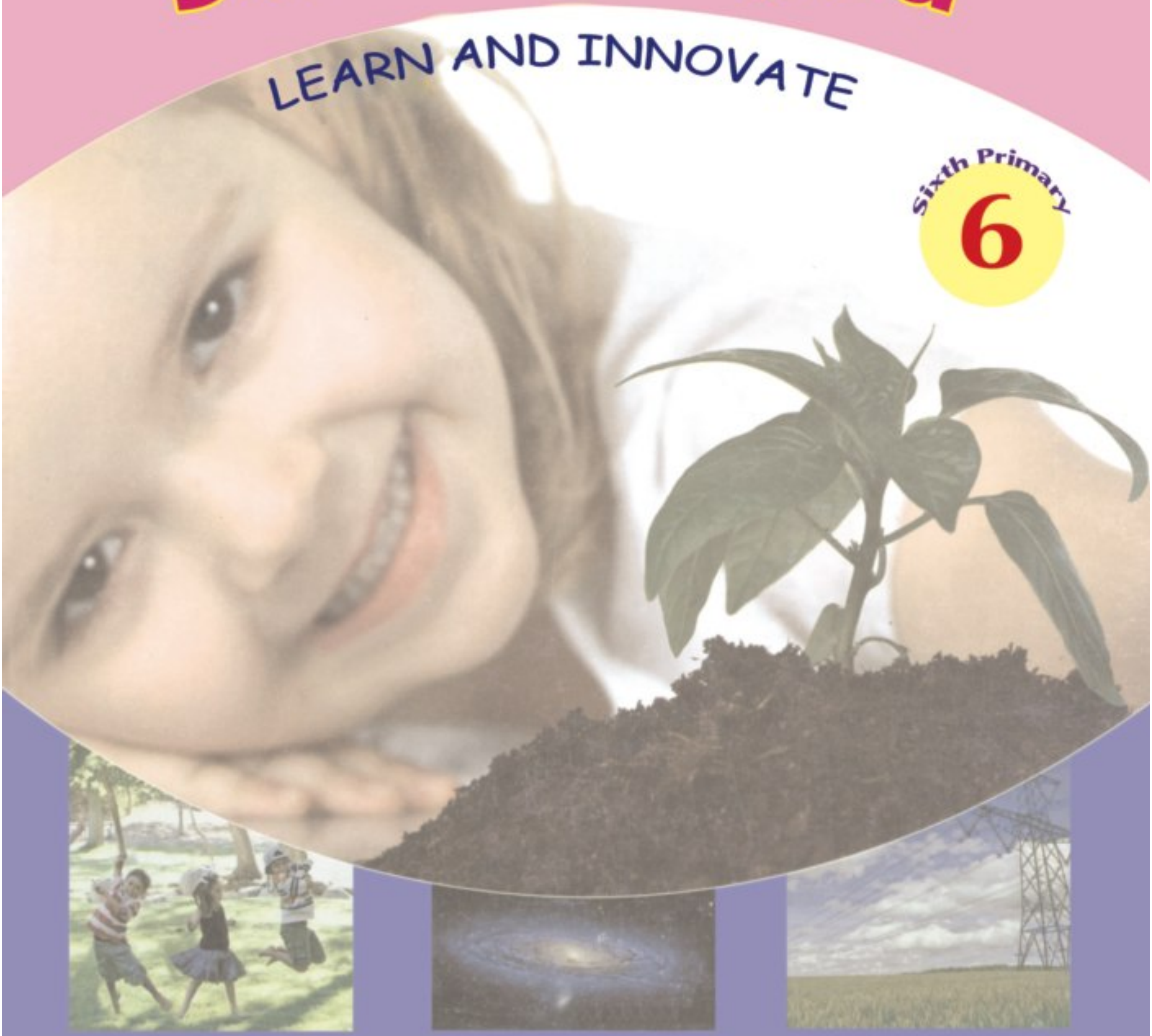

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Second Term

2015 - 2016

Introduction

Dear pupils:

We are pleased to present this book (**Science and you**) which represents one of the cornerstones of the developed curriculum in science for sixth primary grade. This book achieves the curriculum development process to face the challanges of the twenty first century whose beginning goes in line with a competitive revolution in information and communication technology.

The curriwlum aims to achieve the following trends:

- Enlightening you with the relationship between science and technology in the science field and its impact on development.
- Ensurning the suitable situations that indicate the influence of scientific and technological progress in producing knowledge.
- Focusing on your practice of reasonable and effective behavior towards using technological outputs.
- Ensuring your acquistion of the scientific thinking methodology which enables you to move away from education based on recitation and pouring information to education based on self-learning merged with fun and excitement.
- Focusing on your dependence on exploration to reach information and acquire more experiences, through improving basic thinking skills: observation, analysis, deduction and justification.
- Providing you with opportunities to practice the roles of citizenship through self-learning methods, team work, negotiation, persuation, acceptance of the other opinion and avoidance of fanatism.
- Working on your acquisition of life skills and management applied practical abilities through giving more concern to the practical and applied aspects.
- This book consists of four units. Each unit includes integrated lessons that achieve the desired objectives of each unit.

We ask God Almighty that you gain advantage of this book. We pray Him that this book will be one of the cornerstones to be added to the love and belonging to Egypt.

Preparation Team

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Safety in science

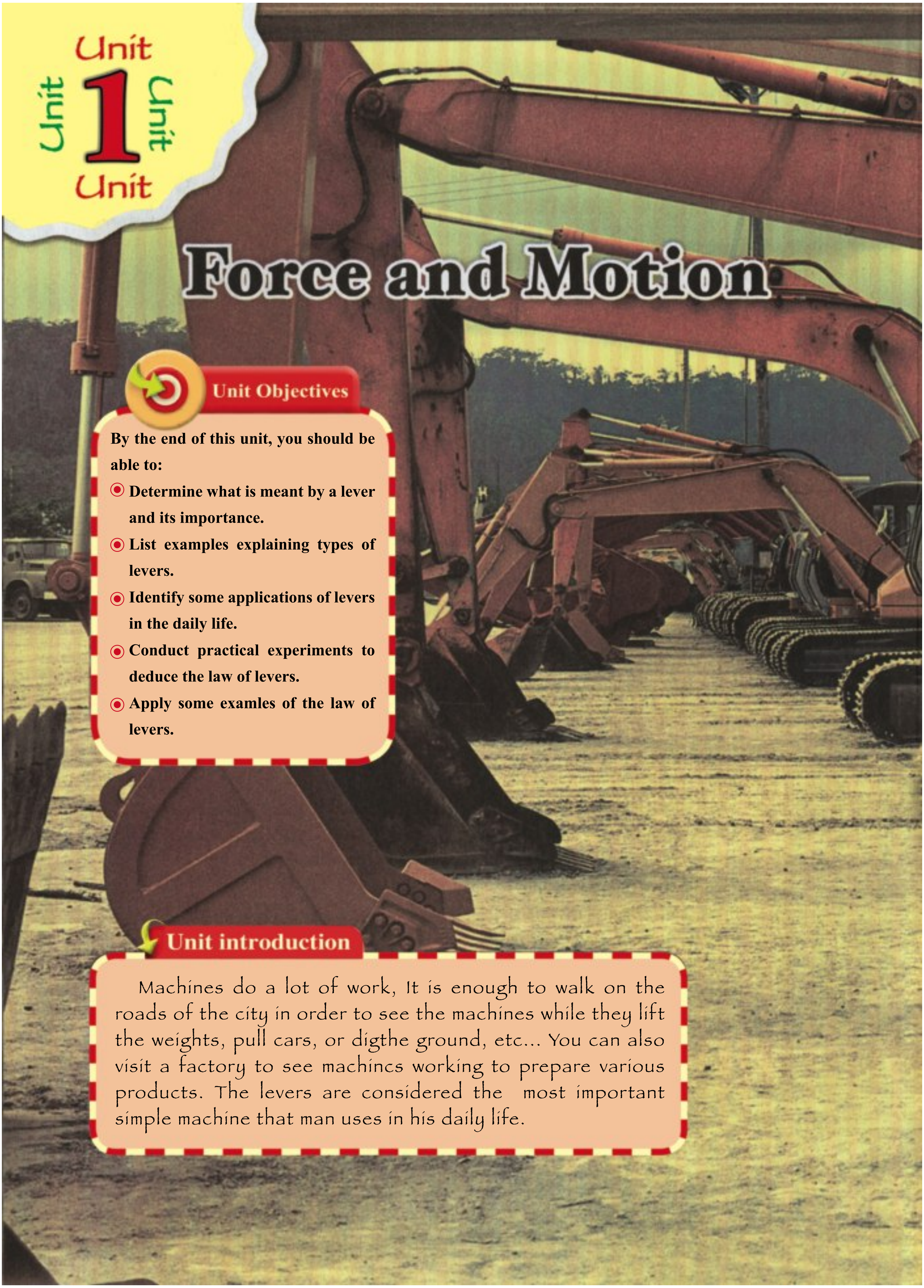
Scientists know that they must work safely when doing experiments. You need to be careful when doing experiments too. Here are some safety tips remember

Safety Tips

- ✔ Read each experiment and activity carefully.
- ✔ Wear safety goggles when needed.
- ✔ Clean up spills right away
- ✔ Never taste or smell substances unless directed to do so by your teacher.
- ✔ Handle sharp items carefully.
- ✔ Tape shap edges of materials.
- ✔ Handle thermometers carefully.
- ✔ Use chemicals carefully.
- ✔ Dispose of chemicals properly.
- ✔ Put materials away you finish an experiment.
- ✔ Wash your hands throughly after each experiment.

Unit 1

Force and Motion



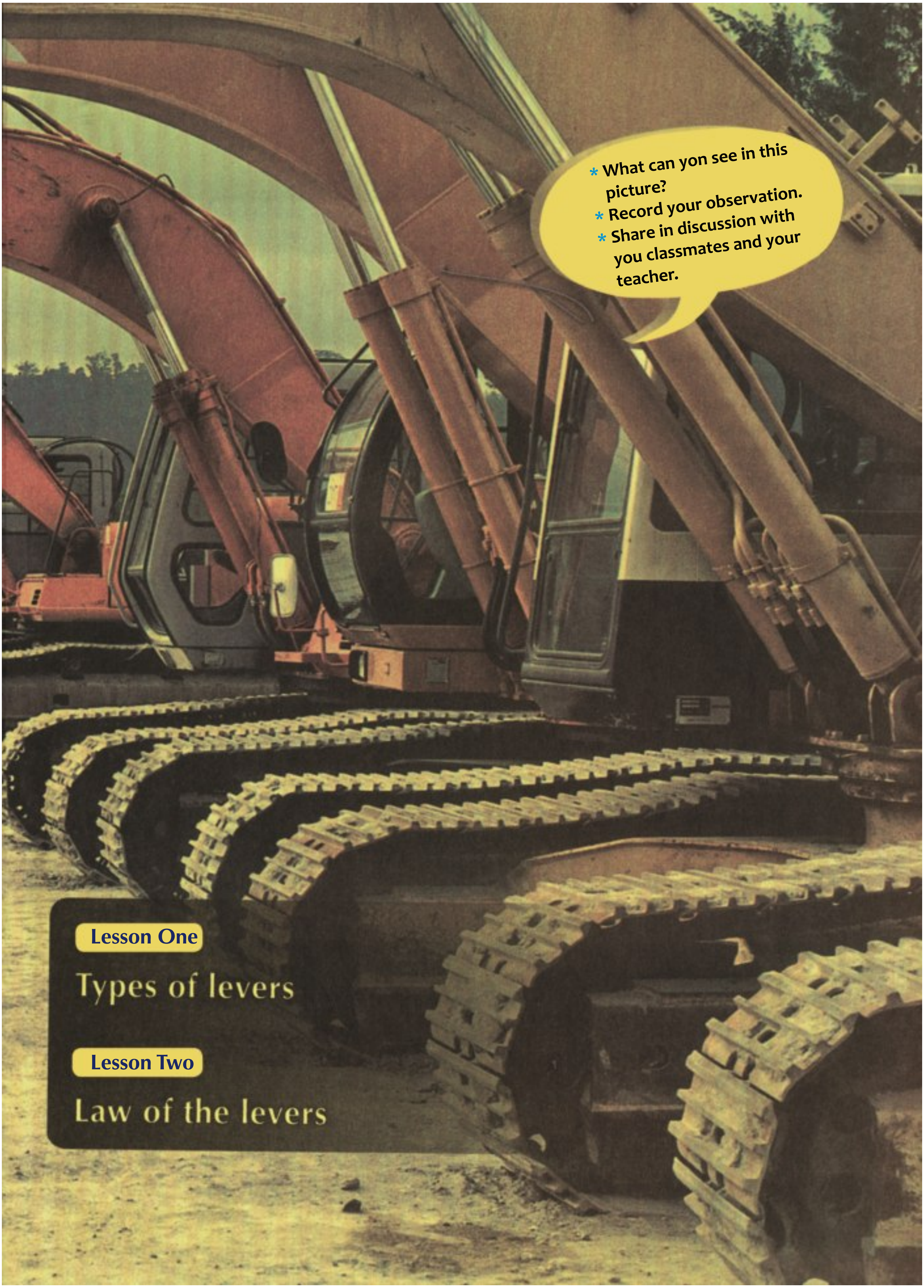
Unit Objectives

By the end of this unit, you should be able to:

- Determine what is meant by a lever and its importance.
- List examples explaining types of levers.
- Identify some applications of levers in the daily life.
- Conduct practical experiments to deduce the law of levers.
- Apply some examles of the law of levers.

Unit introduction

Machines do a lot of work, It is enough to walk on the roads of the city in order to see the machines while they lift the weights, pull cars, or digthe ground, etc... You can also visit a factory to see machincs working to prepare various products. The levers are considered the most important simple machine that man uses in his daily life.



* What can yon see in this picture?
* Record your observation.
* Share in discussion with you classmates and your teacher.

Lesson One

Types of levers

Lesson Two

Law of the levers

UNIT 1

Lesson One (1 -1)

Types of levers

Objectives

By the end of this lesson, you should be able to:

- Determine what is meant by a lever and its importance.
- List examples explaining types of levers.
- Identify some applications of levers in the daily life.

Basic concepts

- Levers
- Force
- Resistance
- Fulcrum

A long time ago, man invented many simple machines to help him perform heavy tasks more easily. Some believe that in the past, levers were the first machines man invented. Levers were first described in the year 260 B.C by the Greek scientist (Archimedes).

Fig (1-1): *Some people believe that in the past, levers were the first machines man invented.*

Exercise

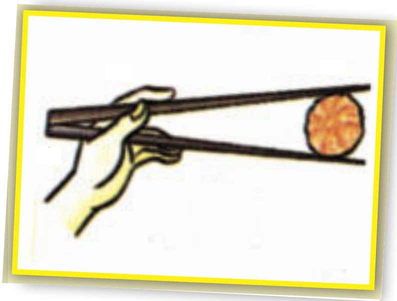
Discover the concept of levers

- In the pictures,there are a group of simple machines followed by several sentences. Examine the pictures then put (✔) in front of the sentences that represent shared properties for all these machines, and put (✘) in front of the sentences that represent unshared properties:

Crowbar

Nutcrackers

Hammer



Sweat holder

The wheel barrow

Bottle opener

Fig (1-2): *A group of simple machines.*

- All of the previous machines are similar in shape and size. ( )
- All of the previous machines consist of a rigid bar (straight or curved). ( )
- These machines are made of the same material. ( )
- All of the previous machines are used to move an object. ( )
- A person inflicts force on each machine. ( )
- There is a fixed point that each machine rotates on. ( )

UNIT 1

Types of levers

★ ***Conclusions:*** the previous machines share in the follwoing:

- They consist of a rigid bar (straight or curved).
- An effort is exerted to overcome the resistance.
- There is a force inflicted by a person to equilibirate the resistance.
- There is a fixed point that the bar rotates on called "fulcrum".
- ***The lever:*** **is a rigid bar that rotates around a fixed point called the fulcrum, and is affected by force and resistance.**

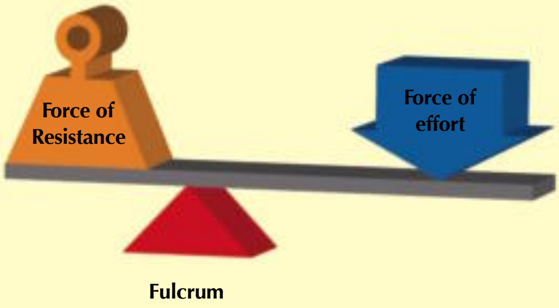
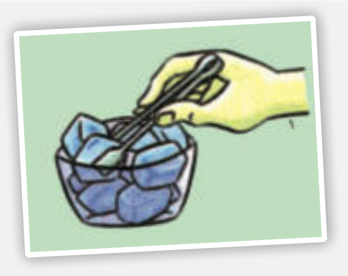


Fig (1-3): *Te lever*

Exercise

Discover the importance of the levers

The following are pictures of some levers. Examine each lever, then write its name and function:



....

....

....

....

....

....

Fig (1-4): *A set of pictures for some levers*

★ ***We deduce that levers make the tasks perform more easily by doing one or more of the following functions:***

- ***Increasing force:*** Some levers allow the conservation of the effort exerted by means of using small force to move heavy load, like in the crowbar and nutcracker.
- ***Increasing distance:*** Some of levers allow exerting a force for a small distance to make an object move a longer distance. With the manual broom, you hand moves small distances at the upper part of the broom, while the lower part moves a longer distance.

Fig (1-5): ***Hockey bat.***

- ***Increasing speed:*** Some of levers allow the increase in the speed of objects we inflict on as in the hockey bat.
- ***Moving the force from one place to another:*** Instead of the person bending down to collect the garbage, he uses the manual broom to move the force of his hand downward.

Fig (1-6): ***Tweezers.***

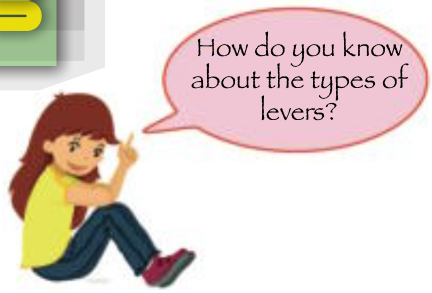
- ***Accuracy in performance:*** For example, you use te tweezers to pick up a very small object.
- ***Avoid dangers:*** Like heat, cold and poisonous materials as in the coal holder.

SEARCH IN THE INTERHET

Use the free electronic encyclopedia:
http://ar.wikipedia.org
to searc about: levers-
types of Levers.

UNIT 1

Types of levers



Types of levers:

Functions that can be performed by levers are determined according to the locations of the force, resistance, fulcrum and according to their relation to each other. Thus, levers are classified into three types:

1 First class levers

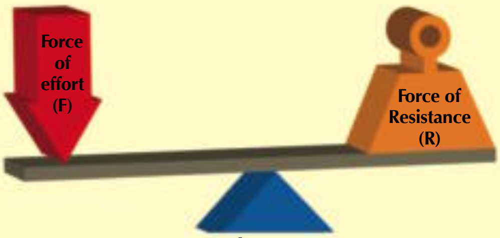
Exercise: Discover first class levers

- The following picture represents one of the types of levers that were designed by a group of students.
  - Examine the picture, then determine the position of:
    - Force of effort (F)
    - Force of resistance (R)
    - Fulcrum (O)

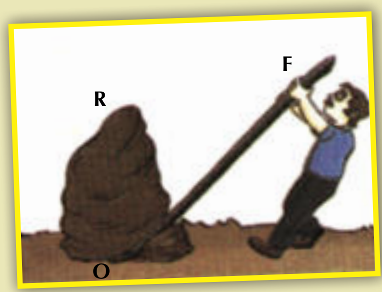
Fig (1-7): *A first class levers*

★ ***We conclude that:***

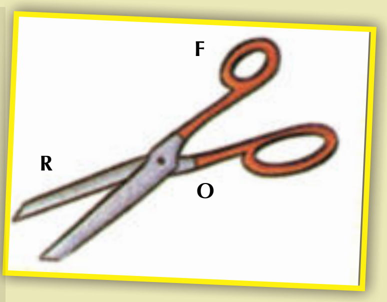
- In the first class lever, the fulcrum is between force and resistance.
- First class levers are considered the most popular type of levers in our daily life. Some examples are:



❖ The see-saw is a lever of the first class lever



❖ The crowbar is a first class lever



❖ The scissors are two levers of the first class lever

Fig (1-8): ***Examples of first class levers***

2 Second class levers

Exercise: Discover second class levers

- The following picture represents one of the types of levers that were designed by a group of students.
  - Observe the picture then determine the position of:
    - Force of effort (F)
    - Force of resistance (R)
    - The fulcrum (O)

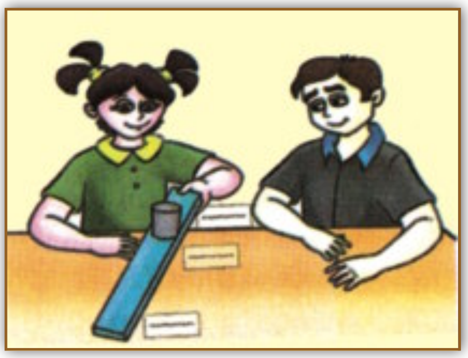
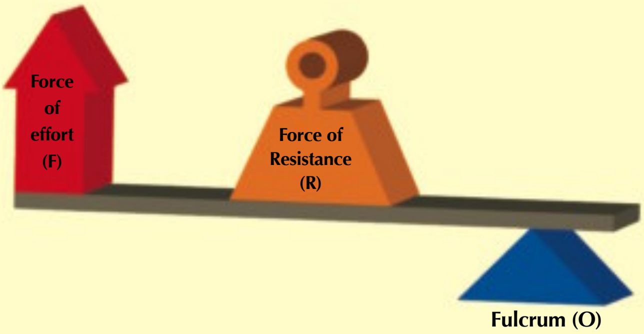
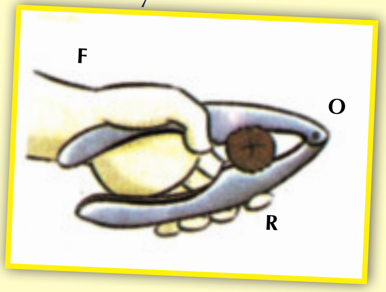


Fig (1-9): *A second class levers*

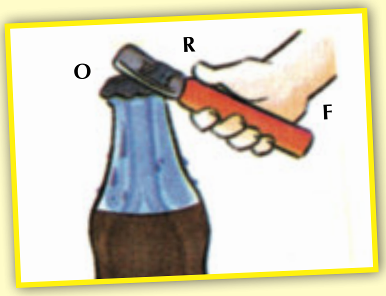
★ ***We conclude that:***

- In the second class levers, the force of resistace is between the force of effort and fulcrum.
- Some of the examples of second class levers in our daily life are:

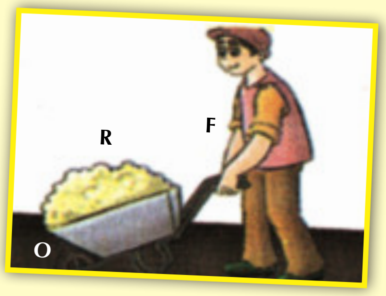




❖ The nutcrackers is the second class lever



❖ The soda-water opener is a second class lever



❖ The wheel barrow is a second class lever

Fig (1-10): *Examples of seconds class levers*

Types of levers

3 Third class levers

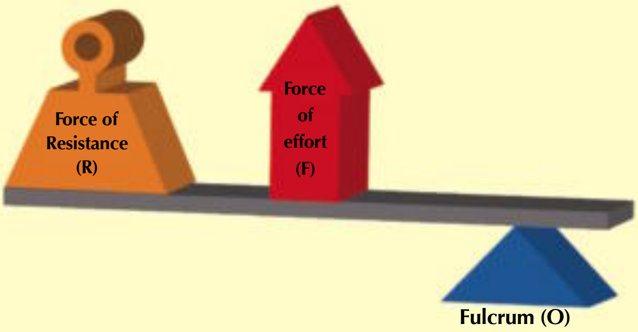
Exercise: Discover third class levers

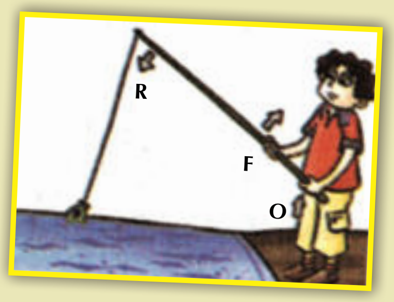
- The following picture represents one of the types of levers that were designed by a group of students.
  - Examine the picture, then determine the position of:
    - Force of effort (F)
    - Force of resistance (R)
    - The fulcrum (O)

Fig (1-11): *A lever of the third class*

★ ***We conclude that:***

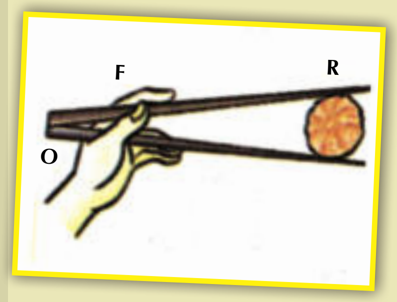
- In the third class levers, the force of effeort is between the fulcrum and the force of resistance.
- Some examples of second class levers in our daily life are:





❖ The fish hook is a third class lever

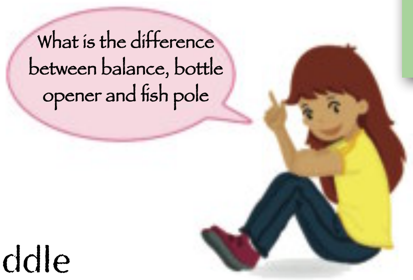
❖ The manual broom is a third class lever



❖ The sweet holder is a double two levers of the third class lever

Fig (1-12): *Examples of third class levers*

How to determine the type of a lever.



- Imagine the way a lever works.
- Determine the position of the force of effort, the force of resistance, and the fulcrum on use.
- Determine the type of the lever by identifying its middle position as in the following:

The middle position	The fulcrum	The force resistance	The force of effort
Type of lever	1	2	3

Exercise

The maize of levers

- Mona is trying to pass through the lever maize to reach the ice-cream at the end of the maize. But, in one condition she has to pass only through the squares that have first class levers.
- Determine the way that Mona should take to get to ice-cream.

Exercises

1 Write the scientific term:

a The fixed point of a rigid bar.

b A rigid bar rotates on a fixed point, and is affected by a force and resistance.

c Levers that have the fixed point between the force and the resistance.

d Levers that have the force between the resistance and the fixed point.

e Levers that have the resistance between the force and the fixed point.

2 Complete the following sentences:

a Levers which make tasks perform more easily by means of ...., ... or ....

b The crowbar is considered a .... class lever, but the manual broom is a .... class lever.

c .... and .... are examples of the first class levers.

d .... and .... are examples of the second class levers.

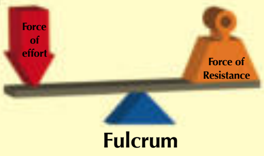
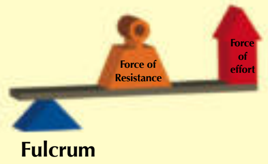
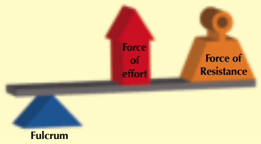
e .... and .... are examples of the third class levers.

3 Classify the following tools according to the type of lever:

❹ **Complete the following diagram:**

Levers

Types

first class	second class	third class
The fulcrum is between the force of effort and the force of resistance	....	....
		
another examples	another examples	another examples
....	....	....

UNIT 1

Lesson Two (1 -2)

Law of levers

Objectives

By the end of this lesson, you should be able to:

- Conduct practical experiments to deduce the law of levers.
- Apply some examples of the law of levers.

Basic concepts

- The arm of force
- The arm of resistance

You learned in the previous lesson that the lever is a rigid bar that rotates on a focal point and is affected by the force and resistance. The force sometimes is smaller than the resistance. It could be larger or equal. Therefore, according to the type of the lever used, what are the factors that determine the values of the force and the resistance in the lever? And what is the relationsip that describes how to change the force with the change in resistance?.

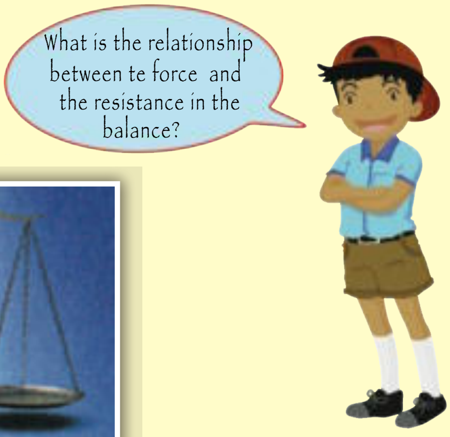


Fig (1-13): *Balance is an example of levers*

Activity

Deduce the law of levers

◉ **What do you need?** Several heavy objects with different weights, a metal bar or a long piece of wood, a strong rope (thread), 1 spring balance, metric ruler.

◉ **What should you do?**

Fig (1-14): *Set the value of the resistance and force*

- Assign the weight of the first object, and let it be your school bag by using the spring balance. Therefore, you have determined the value of "resistance".
- Hang the metal bar from the middle by the thread (fixed point) where it is completely stable in an upright position.
- Fix the bag at one end of the metal bar.
- fix the spring balance at the other end of the metal bar.
- Pull the spring balance down to produce the balance.
- Assign the balance reading at the balance. Therefore, you have determined the value of "force".
- Measure the distance between the force and the fulcrum which is known as "the arm of force".
- Measure the distance between the resistance and the fulcrum known as "the arm of resistance".
- Repeat the previous steps while changing the weight of the object and its position and also the position of the spring balance then record the results in a table of your design.

◉ **Observation:** ....

....

◉ **Conclusion:** ....

....

Law of levers

◉ If we assume that you got the following results from the previous activity:

Object	The force (Newton)	Arm of the force (cm)	Resistance (Newton)	Arm of the resistance (cm)	The force X its arm	The resistance X its arm
1	50	40	50	40	....	....
2	60	30	120	15	....	....
3	70	20	35	40	....	....
4	20	10	25	8	....	....

★ ***From the previous activity, you can deduce waht is known as "the law of levers" and it states that:***

The force X its arm = The resistance X its arm

★ ***By examining the previous table and the law of levers, you can reach the following conclusions:***

- When the arm of the force and arm of resistance are equal, then the force and the resistance are equal as in case (1) in the table.
- If the arm of force is longer than the arm of resistance, then the force is smaller than the resistance and thus the lever conserves the effort as in case (2) in the table.
- If the arm of the force is shorter than the arm of the resistance, then the force is larger than the resistance and thus the lever does not conserve the effort as in case (3) in the table.

Law of levers

Examples:

Example 1:

- The following figure illustrates one of the means of verifying the law of levers without using the spring balance and that is by using a ruler, similar coins and a pencil. Observe the figure, then complete the table using law of levers.

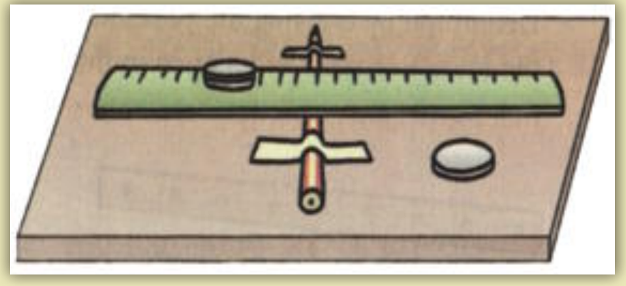


Fig (1-15): *One of the means of verifying the law of levers*

- **Note:** The values of force and resistance are expressed by a number of coins. This is because either the force or the resistace is compatible with the number of coins. The more the number of coins increases, the more the force and the resistance increase:

The force (number of coins)	The arm of the force (cm)	The resistance (number of coins)	The arm of the resistance (cm)
2	5	1	a
3	10	b	10
4	c	2	10
d	15	6	5

Solution:

- **By applying the law of the levers: the force X its arm = the resistance X its arm**

a) 2 x 5 = 1 x arm of the resistance
Arm of the resistance = 10 cm

c) 4 x arm of the force = 2 x 10
Arm of the resistance = 5 cm

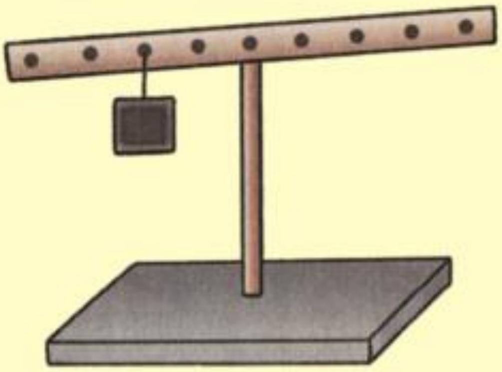
b) 3 x 10 = the resistance x 10
The resistance = 3 coins

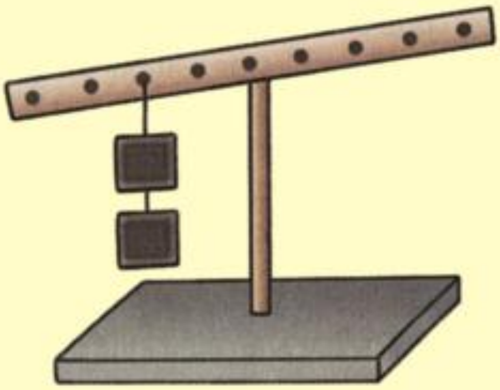
d) The force x 15 = 6 x 5
The force = 2 coins

Law of levers

Example 2:

- Determine by drawing the position where only weight is placed for the lever to regain its balance in the following figures, keeping in mind that the distances between every two openings is 1 cm:

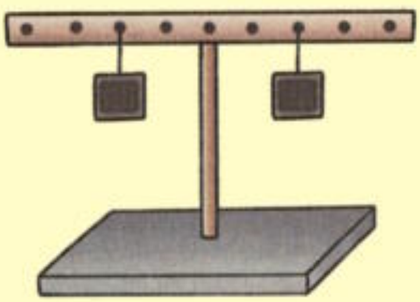




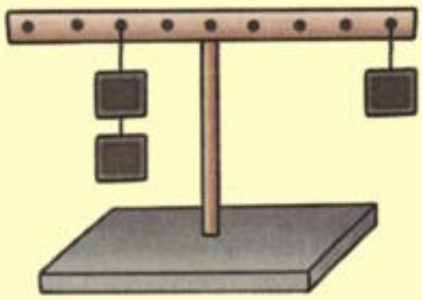
Solution:

- **By applying the law of the levers: the force X its arm = the resistance X its arm**

- The resistance =1 Newton
- The force = 1 Newton
- Arm of the resistance = 2 cm
- The force x its arm = The resistance X its arm
- 1 X arm of the force = 1 X 2
- Arm of the force = 2 cm



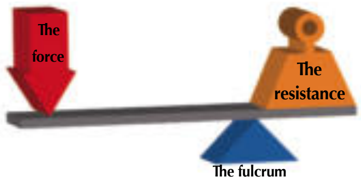
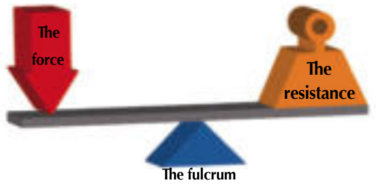
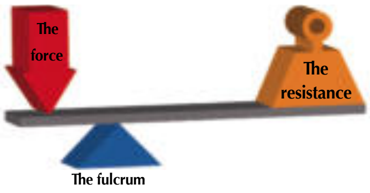
- The resistance =2 Newton
- The force = 1 Newton
- Arm of the resistance = 2 cm
- The force x its arm = The resistance X its arm
- 1 X arm of the force = 2 X 2
- Arm of the force = 4 cm



What are the levers which conserve the effort:

❶ First class levers:

In the first class levers, there are three possibilities in regards to the length of each of the arm of the force and the arm of the resistance. The possibilities are:

Arm of the force is longer than the arm of the resistance	Arm of the force is equal to the arm of the resistance	Arm of the force is smaller than the arm of the resistance
		
The force is smaller than the resistance and thus conservation of the effort (has a mechanical benefit)	The force is equal to the resistance thus no conservation of the effort (has no mechanical benefit)	The force is larger than the resistance and thus no conservation of the effort (has no mechanical benefit)

❷ The second class levers:

The second class levers conserve the effort because the arm of the force is always longer than the arm of the resistance and thus the force is smaller than the resistance (has a mechanical benefit).

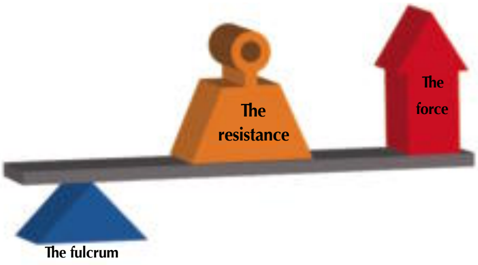


Fig (1-16): *The second class levers*

❸ The third class levers:

Third class levers do not conserve the effort since the arm of resistance is longer than the arm of force, So the force is always larger than resistance.

- Despite the fact that some of the machines do not conserve the effort, but these machines are beneficial in other things such as increasing the distance, speed or precision, etc....

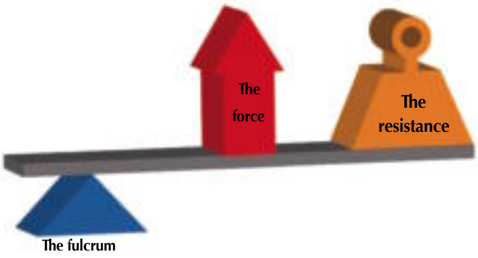


Fig (1-17): *The third class levers*

Law of levers

Exercises

1 Complete the following sentances:

a. The law of levers states that ....

b. The type of levers that always conserves effort is .... while the type of levers that always does not conserve effort is ....

c. There is a conservation of effort for the first class levers if the .... is larger than ....

d. The force and the resistance are equal in levers if ....

2 Explain the following:

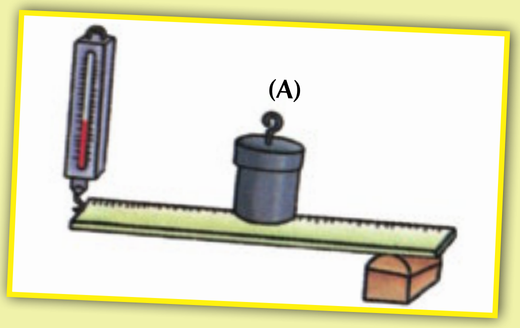
a. The second class levers conserve effort.

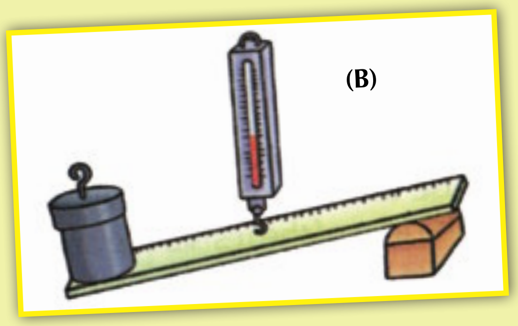
b. The third class levers always do not conserve effort.

c. The force and the resistance can be equal only in the first class levers.

d. Some of the levers are important to man although they do not conserve effort.

3 Determine which of the following levers conserve the effort. Give reason for your answer:





4 The exerted force of the first class lever equals 500 Newton and the length of its arm is 20 cm and is affected by a resistance with a value of 200 Newton. Find the value of the arm of the resistance.

5 Write your own paragraph on each concept:

The force X its arms =
The resistance X its arms

States that

Law of levers

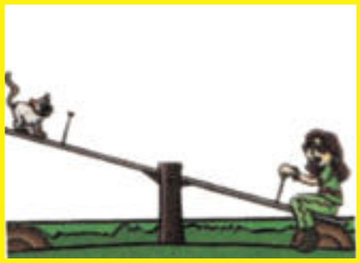
Used in

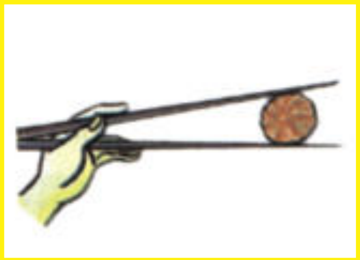
Determining the mechanical purpose of levers

First class levers

Second class levers

Third class levers





....
....

Don't conserve effort when the force arm is equal tothe resistance arm

....
....

Conserve effort

....
....

Apply what you have learnt

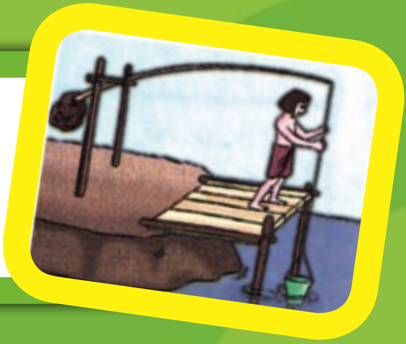
Daily life applications

- Identify levers in your house and explain how these machines conserve man's effort and time.
- Collect some of the levers that you use in everyday life and classify them by type.

Technological applications

- Write a list of levers used in the most common jobs in your local environment. The list contains the name of the lever, class, and job used for.

Research activity



- Write a short essay on the importance of levers in the past and at present using various sources of information as the internet, the library….

Science integration

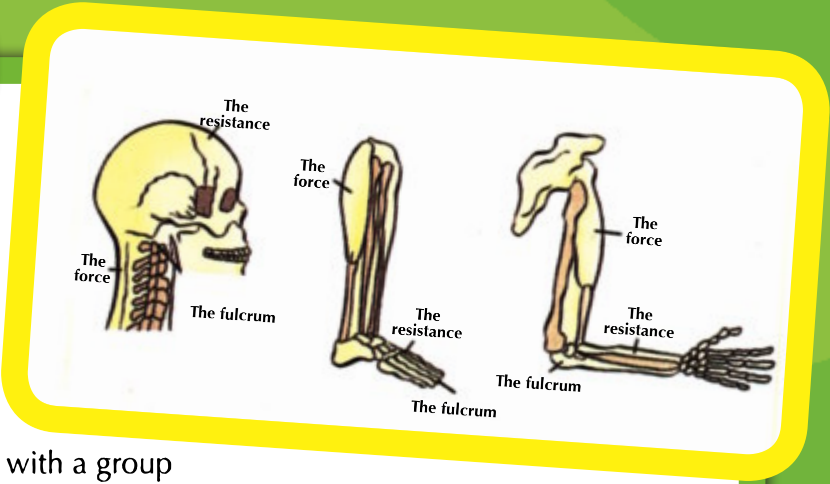
- **Integrating with Math:** Innovate a set of Math problems on the law of levers, then have your classmates solve them.

Making models

- Design a number of levers that can be used in everyday life including the first, second and third classes of levers.
- Design a booklet of pictures on the uses of levers in sports and various entertainments.
- Apply the law of levers in designing a simple scale by using a weight with a mass of 1 kg, a ruler, a thread, an empty yogurt box and a pen.

Healthy aspects

- **Integration with sciences:** In the human skeleton, there are several levers. Determine the importance of these levers.



- **Integration with Mathematics:** Come up with a group of mathematical problems on the law of levers then ask your colleagues to solve them.

Critical thginking

- “Some think that levers that do not conserve effort have no use in the everyday life”. Do you agree with this belief? Show your opinion supported by evidences.

Unit (1) Test

1 Match column (a) with its correspondence in column (b):

Column (a)
First class levers
Second class levers
Third class levers
The levers
The force
The resisance
The fulcrum

Column (b)
Levers that always conserve the effort
Levers that not conserve the effort
Levers that sometimes conserve the effort
Fixed point that a rigid bar sits on
A rigid bar rotates around a focal point, and is affected by a foce and a resistance

2 Put (✔) or (✘) in front of each of the following sentences, and correct the false ones:

a. The first class levers has the resistance between the force and the fulcrum. ( )

b. The second class levers has the force between the resistance and the fulcrum. ( )

c. The third class levers has the fulcrum between the force and the resistance. ( )

d. The crowbar is an example of the first class levers. ( )

e. If the arm of the force is smaller than the arm of the resistance, then the lever conserves the effort. ( )

3 Complete the following sentences:

a. The nutcracker is an example of the .... levers.

b. The manual broom is an example of the .... levers.

c. The scissors are an example of the ....levers.

d. The force × its arm =...................... × ....

e. The type of the levers where the arm of the force and the arm of resistance are equal is ....

❹ **Compare between the three types of levers using the following table:**

Points of comparison	First class lever	Second class lever	Third class lever
Definition			
Conservation of effort			
Examples			

❺ **Classify the following machines according to the type of lever:**

❻ The force affecting a second class lever equals 200 Newton and the length of its arm is 50 cm and a resistance with a value of 100 Newton; calculate the value of the arm of the resistance.

❼ The arm length of a third class lever is 5 cm, and the length of the arm of the resistance is 15 cm. If the resistance has a value of 300 Newton, Calculate the value of the affecting force.

Unit 2

Electric Energy

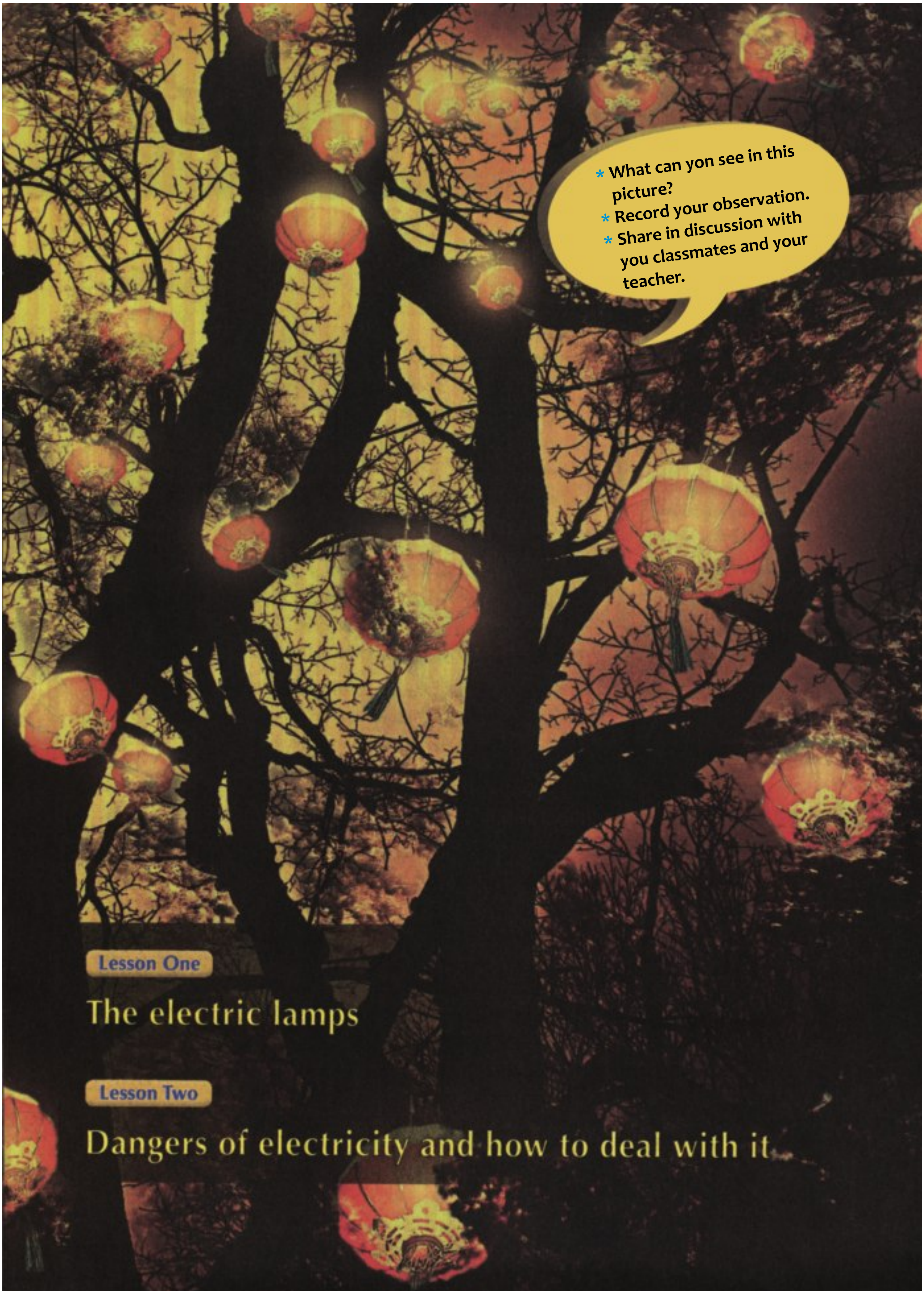
Unit Objectives

By the end of this lesson, you should be able to:

- Identify the structure of some electric lamps.
- Compare between the ways of connecting electric lamps. in series and in parallel.
- Deduce the way to connect electric lamps in the house.
- Conduct experiments to determine some solid materials that are conductors and non-conductors of electricity.
- Identify dangers of electricity and precautions in dealing with it in the house.

Unit introduction

Electric energy is one of the important energies used in our lives. We use it in lighting the lamps and in operating several electric machines in the house. Despite the importance of electric energy, there are several dangers and harms if we handle it with neglect and carelessness.



* What can yon see in this picture?
* Record your observation.
* Share in discussion with you classmates and your teacher.

Lesson One

The electric lamps

Lesson Two

Dangers of electricity and how to deal with it

UNIT 2

Lesson One (2 -1)

The electric lamps

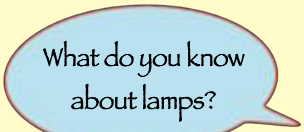
Objectives

By the end of this lesson, you should be able to:

- Identify the structure of some electric lamps.
- Compare between the ways of connecting electric lamps. in series and in parallel.
- Deduce the way to install electric lamps in the house.

Basic concepts

- Electric lamps
- Electric current
- Light bulbs
- Fluorescent lamps
- Electric circuits
- Connecting in series.
- Connecting in Parallel.



It is known that the sun is main source of light. When man felt that daylight is not enough and felt the cruelty of night, he started to search for artificial light sources that allow him to perform his activities at night fall. It has not been too long that all light sources depended on torches.

Now torches, candles, and oil lamps have disappeared from most of the countries in the world to be replaced by what is known as electric lamps. The electric lamp represents a constant source of light that is clear, bright, and smoke, vapors and odors free. So, what is the electric lamp installation and what are its types?

Fig (2-1): *Some types of the oil lamps that were used in the lighting before discovering the electric lamp*

Electric lamps:

There are many types of electric lamps, some are glowing which emit light through heating a special type of a wire made of tungsten till glowing while other electric lamps generate light from the vapour or gas when electric current passes through it.

Although there are many types of used electric lamps nowdays but we are going to study most popular ones which are light bulbs and fluorescent lamps.

Some types of electric lamps

Scientists helped humanity

Thomas Alpha Edison is an American inventor that invented the light bulb. When he died, all the lights and lamps in America were turned off, as the world before him was that way.

First: Light bulbs:

Light bulbs are considered the most popular source of artificial light in almost every house. Also car lights and torch are considered one type of light bulbs. To recognize how to install the light bulbs; co-operate with your colleagues to conduct the following activity:

Activity
Parts of The light bulb

- **What do you need?** Light bulb, a magnifying lens.
- **What should you do?**
  - Check the light bulb with the magnifying lens thoroughly and be careful it does not break.
  - Identify the main parts the light bulb consists of and record your observations.
- **What do you observe?** ....
  ....
- **What do you conclude?** ....
  ....

Fig (2-2): *A light bulb and a magnifying lens*

The electric lamps

From the previous activity, we deduce that the light bulb consists of three main parts They are:

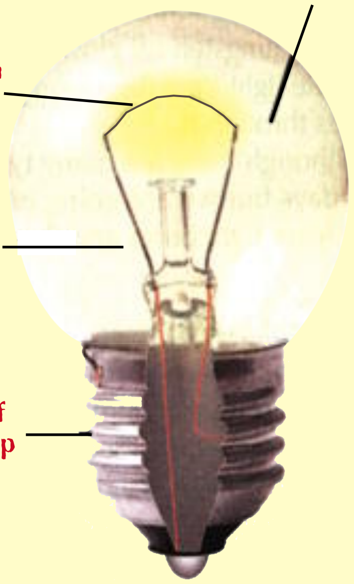


Fig (2-3): *The light bulb consists of three main parts*

❶ The filament:

It is a coiled thin wire from tungsten that has electricity flowing through it by means of connecting wires from copper and lead that connect the base of the lamp to the filament. This makes the filament glow on heating and emits light. The tungsten is used because its melting point is high which protects it from melting in high temperatures.

❷ A glass bulb:

Its function is to prevent air from reaching the filament thus protects it from burning. Most of the lamps contain one type of the inert gases as the argon gas instead of air to increase the life of the filament.

❸ The base of the light bulb:

It carries the lamp upright, positions it, and connects the lamp with the electric circuit. There are two types of lamp bases. The first is spiral and has a piece of lead for connection and the second has two side nails and two inside pieces of lead for connection.

Fig (2-4): *The nail light bulb base that has two pieces of lead for connection.*

Fig (2-5): *The spiral light bulb base that has a piece of lead for connection.*

Second: The fluorescent lamps:

The fluorescent lighting lamps, known as neon lamps, are used in houses, offices, decorating commercial stores, and commercial advertisements. What are the parts of the fluorescent lamps?.

Fig (2-6): *The fluorescent lamp are used to light the underground metro.*

The Components of the fluorescent lamp:

❶ **Glass tube:**

It is vacuumed and contains the inert argon gas and it also contains a little of mercury vapor and the inner tube surface is covered with a phosphoric material.

❷ **Two filaments of tungsten:**

At the tips of the lamp from the inside.

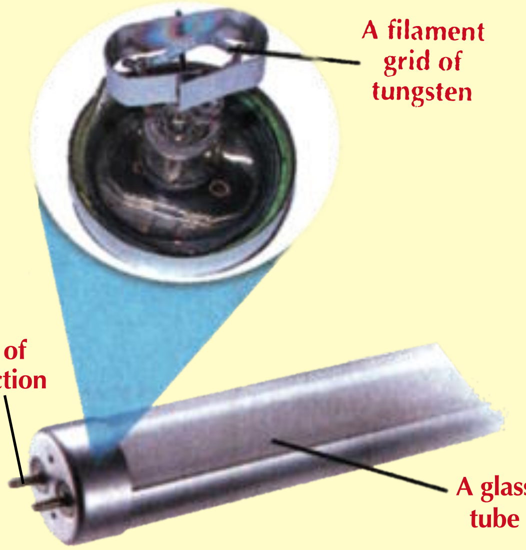


Fig (2-7): *Parts of the fluorescent lamp*

❸ **Points of connection:**

There are two points of connection on each tip of the lamp to cconnect the electricity.

Do you know?

The inert neon gas is not used in making the fluorescent lamp but these types of lamps are known as the neon lamps.

UNIT 2

The electric lamps

There are two methods to connect electric lamps which are: connecting in series and connecting in parallel.

First: Connecting the electric lamp in the electric circuits:

The simple electric circuits consist of a battery (the electric current source), a lamp and wires to connect the battery to the lamp.

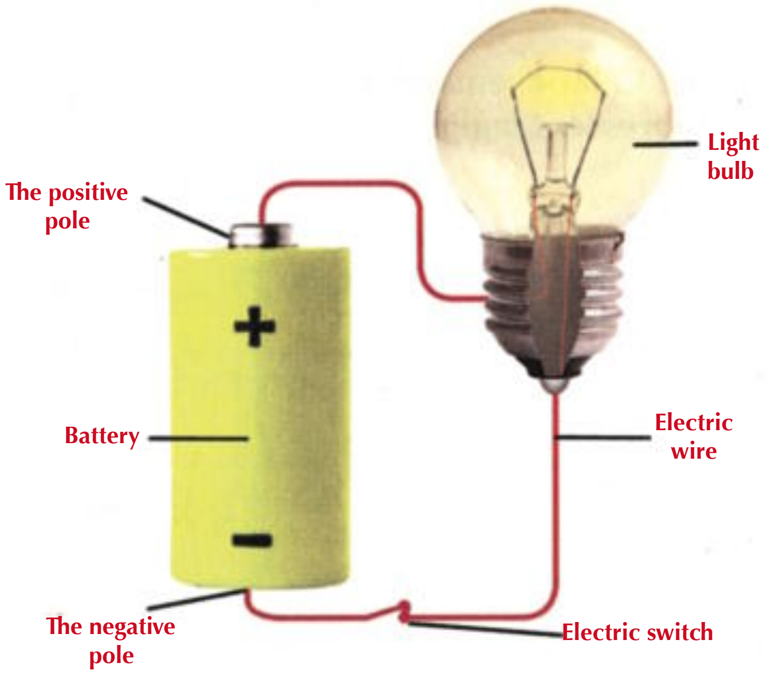


Fig.(2-8): *The simple elelctric circuit*

In order for the electric current to pass through the circuit, we must connect all the parts of the electric circuit. In this case, the circuit is a closed one, thus the electric current passes through. In case that any of the parts are not connected, the electric current does not pass through.

1 Connecting in series in the electric circuits:

In order to recognize the way of connecting in series, cooperate with your classmates to conduct the following activity:

Do you know?

There is a type of fluorescent lamp known as combined fluorescent lamp. This type is different from the bulb lamps because it does not consume electric current as the light bulbs. It stays longer than the ordinary electric bulbs from 8 to 18 times. It is assumed working time is form 8000 to 15000 hours. While the bulb lamps are from 750 to 1000 hours.

Activity

Recognize the way to connect electric lamps in series

What do you need? 4Small light bulbs, 4 light bulb holders, battery, masking tape copper connecting wires with naked tips, and a screw driver.

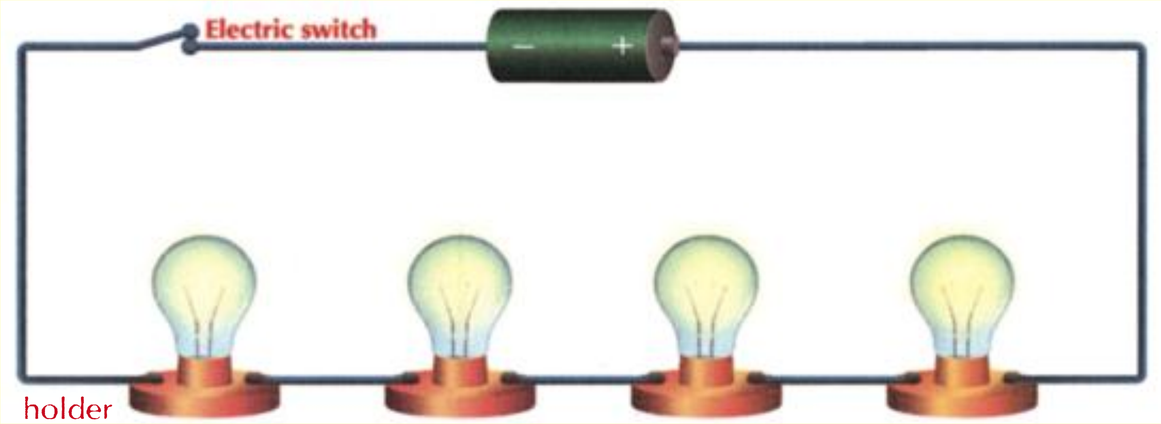


Fig (2-9): *Four light bulbs connected in series*

What should you do?

- Fix a bulb inside the holder.
- Use the screw driver to fix the connecting wires to the bulb holder.
- Fix the tips of the connecting wires to the tips of the battery with the masking tape and observe the light intensity of the bulb.
- Add another light bulb by using another bulb holder and connect it by using the connecting wires as shown in the drawing, and compare between the light intensity of one bulb and the light intensity of both bulbs?
- Repeat the previous steps until they become four light bulbs and compare in each time between the light intensity of one bulb and the light intensity of more than one bulb?
- Unscrew one lamp in the electric circuit while it is connected (closed), what do you observe?
- By using a pencil draw a line starting from the battery from one of its tips and ending with the other tip while passing through the lamps and observe the shape of the line?

What do you observe? ....

What do you conclude? ....

The electric lamps

❶ Connecting the lamp in parallel in the electric circuit:

To recognize this way of connecting electric lamps in paralled, collaborate with your colleagues to conduct the following activity:

Activity

Recognize the way to connect the electric lamps in parallet

- **What do you need?** 4 Small lamps, 4 Small lamp holders, masking tips, copper connecting wires with naked tips, and a screw driver.
- **What should need?**
  - Fix two lamps inside two holders.
  - Use the screw driver to fix the connecting wire to the two holders as shown in the figure.
  - Fix the connecting wire tips to the tips of the battery with the masking tape and observe the light intensity of the two lamps?.
  - Add two other lamps and compare between the light intensity of the two lamps and the light intensity of four lamps.
  - Unscrew one lamp in the electric circuit while connected (closed), what do you observe?.
  - By using the pencil draw a line starting from one tip of the battery and ending at the other tip while passing through the lamps: record your observations.
- **What do you observe?** ....
  ....
  ....
- **What do you conclude?** ....
  ....
  ....

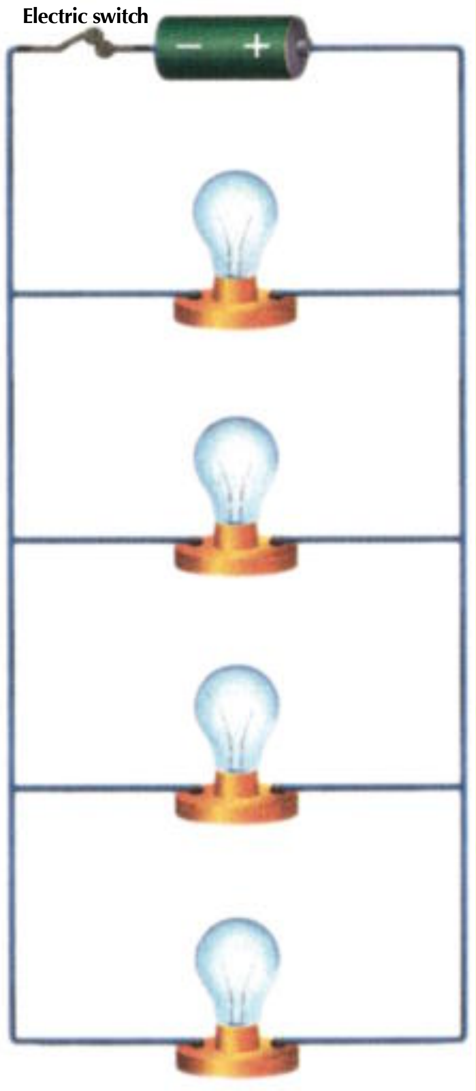


Fig (2-10): *Four lamps connected in parallel*

★ *We deduce from the previous activities that:*

- When we connect the light bulbs in series the electric light bulbs are connected one after another.

  Therfore, there is one route for the electric current to pass through in the circuit, thus when we cut this route by unscrewing a bulb or when it burns out the current does not continue to flow and all the bulbs in the elecric circuit are turned off.

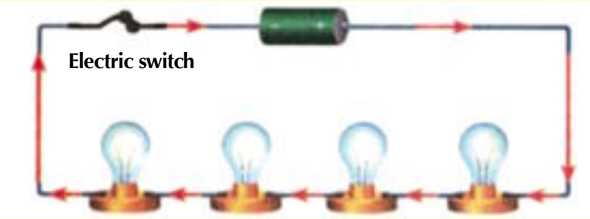


Fig (2-11): *Connecting in series : There is one route for the flow of the electric current in the circuit.*

- When we connect more than one bulb with the circuit in series the lighting of the bulbs decrease until weakens when a large number of bulbs are connected to the circuit.
- When we connect the eletric bulbs in parallel, the electric bulbs are connected in branching routes.

  The electric current has more than one route to pass through in the cicuit. Therfore when we cut one of these routes by unscrewing one bulb or when it burns out the current moves in the other routes and the rest of the bulbs in the circuit do not turn off.
- When we connect more than one bulb with the circuit in parallel the lighting of the bulbs remain as it is.

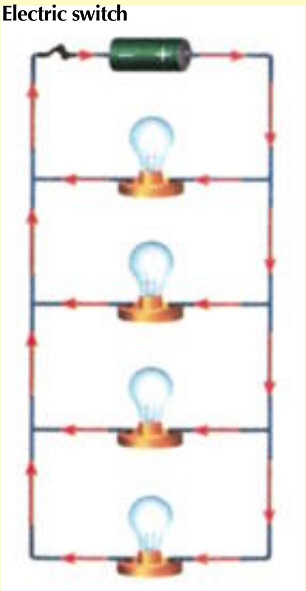


Fig (2-12): *Connecting in parallel: There is more than one route for the flow of the electric current in the ciecuit.*

Life applications

In the decorative lights used in religious celebrations and weddings, the lamps are connected in parallel. Therefore this makes it easier to reach the burnt out lamp and replace it besides the burning out of the lamp does not cause the current to be cut off in the rest of the lamps and they turn off.

Fig (2-13): *lamps are connected in paralled.*

The electric lamps

Second: Connecting electric lamps in a house:

How are the various electric lamps in a house connected? Are they connected in parallel or in series? To answer the previous question, cooperate with your colleagues to conduct the following activity:

Activity

Recognize the way to connect the electric lamps in house

What should you do?

Fig (2-14): *Ways to connect the electric lamps in the house.*

- Turn on the lamps in all the rooms of the house.
- Operate one of the electric machines in one of the rooms like the radio or the television.
- Turn off an electric lamp in one of the rooms. Then observe the rest of the lamps in the rest of the rooms. Are they still on or did they turn off and record your observation?
- Observe the electric machine: is it still working or did it turn off and record your observation?

What did you observe? ....

What did you conclude? ....

★ ***We conclude from the previous activity that:***

- All lamps in the house are connected in parallel. The lamps in the house are connected to the main distributer of the energy but they function independently. Thus, each lamp functions alone and the lighting in each room is independent from the lighting in any other room so that turning off or the damage of any of the lamps in a room does not affect the lamps present in the rest of the rooms.

Exercises

1 Complete the following sentences:

a Some of the types of electric lamps are .... and ....

b The Filament of the light bulb is made of .... and that is because it has a high ....

c The light bulb cosists of .... ,.......... and ....

d The fluorescent lamp contains .... gas.

2 Write the scientific term for each of the following:

a A way in which the bulbs are connected one after the other, and the light intensity of the bulbs decreases with the increase in their number.

b Means of converting the electric energy to light energy.

c The way where the bulbs are connected by branching routes and the lighting of the lamps is not affected with increase in their number.

3 What happens if:

a You make the filament of the light bulb from iron.

b There is air inside the light bulb.

c The light bulbs in the house are connected in series.

4 Write a scientific explanation for each of the following:

a There are two pieces of lead in the light bulb.

b The light bulbs are connected in parallel in the house.

c The filament of the light bulb is made of tungsten.

UNIT 2

Lesson Two (2 -2)

Dangers of electricity and how to deal with it

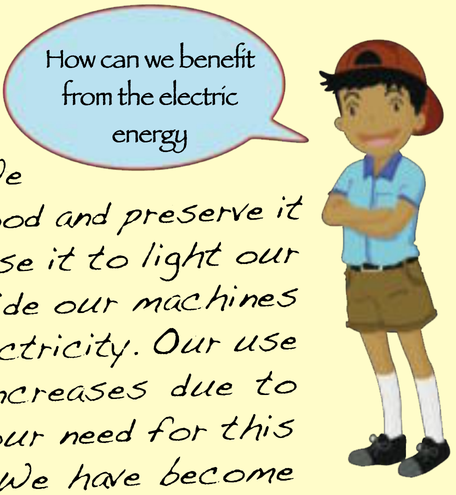
Objectives

By the end of this lesson, you should be able to:

- **Conduct experiments to determine some solid materials that are conductors and non-conductors of electricity.**
- **Identify the dangers of the electricity and the precautions in dealing with it in the house.**

Basic concepts

- **Electric conductors.**
- **Electric insulators.**



It is difficult to imagine the world around us without electric energy. We use it to cook food and preserve it cold. Also, we use it to light our houses and provide our machines and toys with electricity. Our use of electricity increases due to the increase in our need for this type of energy. We have become unable to live without it. But despite the many benefits of electricity in a person's life as well as the society, it can cause danger the safety of lives and properties and can be the reason for the occurrence of fires, explosions or even death of people. But it is fair to say that electricity is dangerous to those who neglect or ignore the safety precautions and instructions that have to be followed while dealing with it.

Fig (2-15): *Using the electric energy in cooking food*

Before identifying the dangers of the electricity and the precautions to deal with it, you have to recognize conductors of electricity and insulators of electricity. This is in order to help us while handling the various electric machines.

Activity

Discover conductors of electricity and insulators of electricity

What do you need? Battery 1.5 volt, lamp 1.25 volt, lamp holder, masking tape, two pins, small square piece of cork, three wires with naked tips, screw driver, group of metal materials, and non-metal (key, nail, coin, plastic button, small piece of cloth, eraser).

What should you do?

- Wrap the tips of two wires around two drawing pins as in the figure, then stick the two pins in the piece of cork.
- Fix a tip of one of the previous wires to the battery using the masking tape, and position the other wire in the battery holder.
- Fix the third wire to the other tip of the battery and the lamp holder.

Fig (2-16): *Good conductors and insulators of electricity.*

- Test connecting some of the metal materials (key, nail, and coin) to the electric current by placing it on the pins to connect them. Observe what happens to the lamp and record your observation.
- Repeat the previous steps but use non metal bodies (plastic button, piece of cloth, and eraser), and observe what happens to the lamp, and record your observation?

....

- Complete the following table with what you deduced from the activity:

Conductors of electricity	Insulators of electricity

What do you observe? ....

What do you conclude? ....

Dangers of electricity and how to deal with it

★ ***From the previous activity, we can deduce the following:***

- Materials are divided into two types according to its conductivity of electricity: materials that are conductors of electricity, and materials that are insulators of electricity.
- Conductors of electricity are the materials that allow the flow of electricity through it like metal materials (iron, copper and aluminium). So, when present in an electric circuit it completes the circuit (to make it closed) which causes the electric current to flow in the whole circuit.
- Insulators of electricity are the materials that do not allow the flow of electricity throught it like (plastic, rubber, wood, and glass). So, when it exists in an electric circuit, it does not complete the circuit which prevents the electric current to flow in the circuit.

Life applications

Electricity reaches our houses from electric power stations where the electric current is transmitted through metal cables hanging on high towering poles, and these cables are covered with long insulating materials which prevent the electric current from moving from the cables to the towering poles.

Fig (2-17): *Grid network*

Fig (2-18): *Electricity is safe if it is handled cautiously*

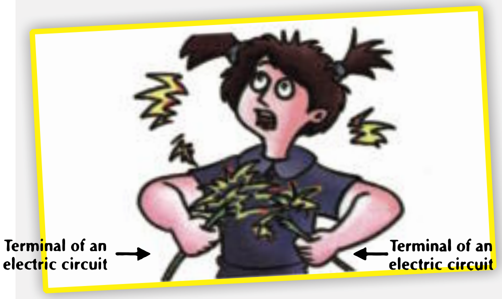
First: Dangers of electricity:

Electricity is considered safe if it is handled cautiously. But, if handled with neglect, hastiness or in an improper way, it can cause a lot of dangers.

Exercise

Identify the dangers of electricity

◉ The following pictures show some possible dangers that electricity leads to. Write under each picture the danger that the picture expresses and the result of the improper use of electricity.



....

....

Fig (2-19): *Some possible dangers which the electricity causes.*

★ ***From the previous exercise, we deduce that there are two types of injuries resulting from improper use of electricity:***

- *The first type:* **Direct injuries** including fires resulting from electricity, the electric shock and the burns.
- *The second type:* **Indirect injuries** caused by electricity and they are not the direct cause, like injuries caused by falling from top of a ladder due to an electric shock.

Dangers of electricity and how to deal with it

Fig (2-20): ***Increasing the electric load could be the cause of fires oceurrence***

Enriching information

The human body is considered a good conductor of electricity and that is because 70% of the human body contains water.

❶ Fires resulting from electricity:

Reasons:

- Placing an electric machine that generate heat (electric iron, electric heater and spot light) near to flammeoble items like (furniture, curtains,rugs, and clothes) lead to the occurrence of fire due to the burning of these items.
- Increasing the electric load by operating more than one machine by means of one socket.
- Not disconnecting the electric current from the electric machines that generate heat after use; an act which leads to the increase in the temperature of the machine that could cause it to burn.

The difference between fire caused by electricity and regular fire:

Water is used to put off the regular fire, but we cannot use it to put off the fire resulting from electricity. That is because impure water is considered one of the liquid materials that is good conductor of electricity. Therefore, using it increases the fire and could harm the rescuers.

The electric shock:

- The electric shock is the result of an electric current passing through the human body.
- The harms resulting from an electric shock depend on the strength of the current passing in the human body and also on the time it took for the current to pass through the human body. In many cases, the electric shock causes death.

As we previously mentioned, electricity should pass in closed circuits. The electric shock occurs when your body is a part of the electric circuit and results in its completion (closure) which leads to the flow of the electric current from a part of your body and its exit from another part. This happens when:

- A part of your body touches non insulated wire that has an electric current in it and touches the ground with another part.
- You touch with one part of your body non insulated wire that has an electric current in it and touches a material conducting electricity and connected to the ground.

- You touch two non insulated wires conducting electricity.

As we previously mentioned, the electric shock can lead to indirect harms like falling from top of a ladder and resulting in various injuries.

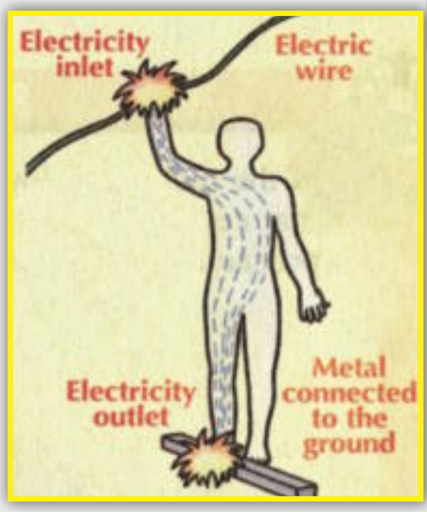


Fig (2-21): *The passing of the electric current through the human body may result in an electric shock*

2 The burns resulting from the electric current

Burns result in the damage of body tissues as a result of:

- Touching a part of the body directly to an electric current source which results in the occurrence of the burns and this type can be as a result of the electric shock.
- Touching fire or the spark resulting from the occurrence of an electric fire to a part of the body.
- Touching an electric machine that generates heat (heater, electric iron, electric heater) directly with a part of the body, thus causing burns.

Life issues

First aid when accidents occur as a result of the electric current

Fig (2-22): *First aid for electric current accidents.*

a. The injured is insulated from the electric current by disconnecting the electricity or by insulating him immediately from the elelctric source by pushing the injured by anything that is non-conducting of electricity such as a piece of wood or plastic.
b. Call the physician immediately to the accident location or transported to the nearest hospital.
c. If the injured is breathing, you must facilitate his breathing by opening up the tight clothes.
d. It is a must to maintain the heart beats by massaging by means of pressing on the chest with the palms of the hand.
e. If the injured cannot breathe, start immediately artificial respiration.

Dangers of electricity and how to deal with it

Second : Precautions in dealing with electricity:

Precautions in dealing with electricity

Exercise

- In the pictures below there are wrong patterns while dealing with electricity that could lead to several dangers. Observe the pictures well then write the precautions that must be followed to prevent the danger of electricity.

Fig (2-23): Precautions in dealing with electricity:

- **Precautions in dealing with electricity:** ....
....
....

★ ***From the previous exercise, we deduce that some precautions in dealing with electricity are:***

- Do not place several connections in the same socket.
- Do not insert a metal object in the socket (nail, non insulated screw driver, metal wire).
- Place a piece of plastic in the socket to prevent inserting another body in it.
- Do not touch the electric machines that are connected to the electrical current with a wet hand.
- Do not leave an electric machine or heater connected with the electrical current while taking a bath.
- Do not play with the electric connections.
- Do not try fix, maintain or clean any electric machine while connected with the electric current.
- Do not place the flammable materials (as curtains, furniture, clothe, covers, rugs, paper) near the electric machines that emit heat (as electric iron, electric heater, spot light, the heater).
- Do not leave the wires naked not insulated.
- Do not place the electric wires extending on the ground so no one trips on them while walking and avoid placeing them under the rugs.

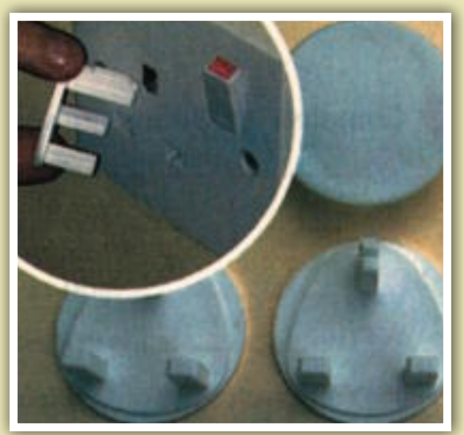


Fig (2-24): *Placing a piece of plastic in the socket to prevent inserting anything inside it*

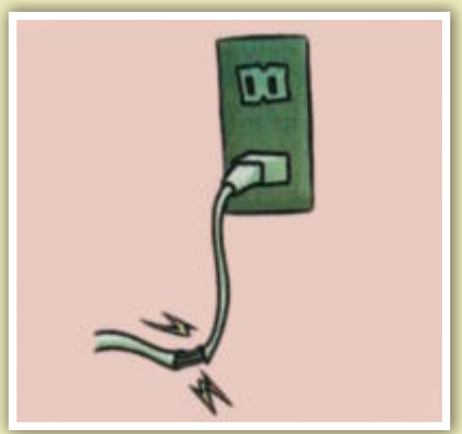


Fig (2-25): *The naked wires lead to a number of dangers*

Dangers of electricity and how to deal with it

Exercises

1 Complete the following sentances:

a .... and .... are examples of materials that are electric conductors.

b .... , ... and .... are examples of materials that are electric insulators.

c .... , ... and .... are some of the dangers of direct electricity.

d The .... leads to destroying the tissues of the body.

e You cannot put out the electric fire with water because water is ....

f .... , ... and .... are some of the causes of the electric fires.

g The electric shock occurs as a result of passing .... through the human body.

h The harms resulting from an electric shock depend on .... and ....

i .... and .... are some of the precautions to deal with the electricity.

j .... , ... are some of the causes of the burns resulting from the electricity.

2 What would happen if : ....?

a You insert a metal bar in an electric socket.

b You place the electric heater too close to furniture and rugs.

c You spark resulting from the electric fires touches any part of the body.

d Touching a naked wire while touching the ground.

e The electric fire is put out by water.

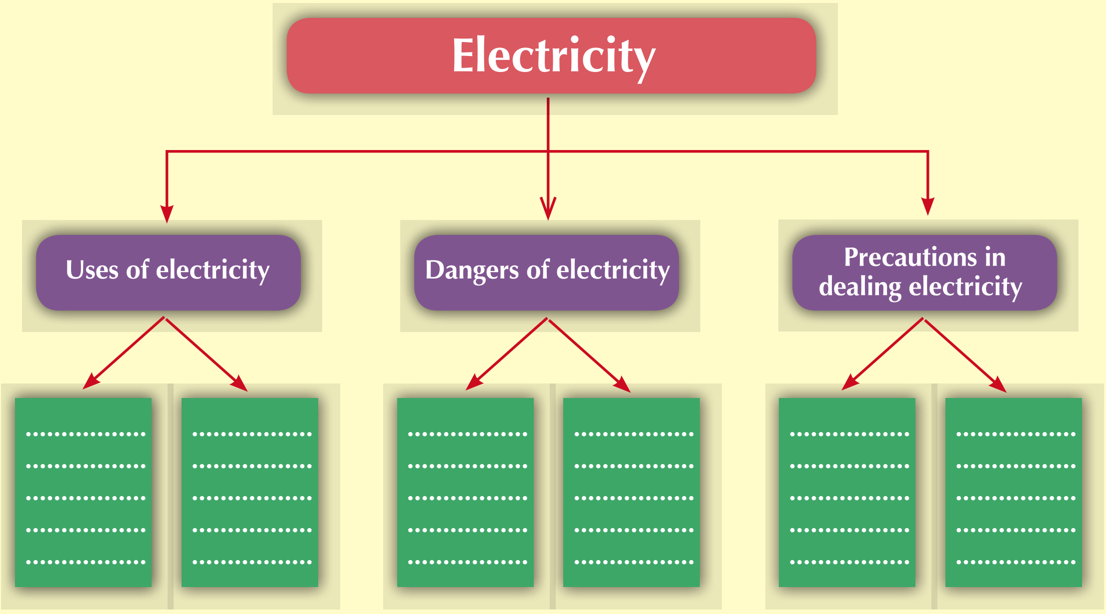
3 Write the scientific term for each of the following:

a One of the dangers of electricity occurs as a result of the passage of the electric current to the human body.

b Fires occur as a result of the increase in the termperature of the electric machines.

c One of the dangers of the electricity is causing the damage of the tissues of the body.

❹ Complete the following diagraam:



Apply what you have learnt

Research activity

- Under the supervision of your teacher and in collaboration with your classmates, write a research sheet on the following while getting assistance from the school library and the Internet:

  The uses of electricity and its dangers.

  The electric lamp as a turning point in the history of human civilization.

Life applications

- Write a list of the precautions to deal with electricity and apply it in your house.
- Make a wall chart indicating the dangers of the electricity and the precautions to deal with it and hang it up in the classroom.

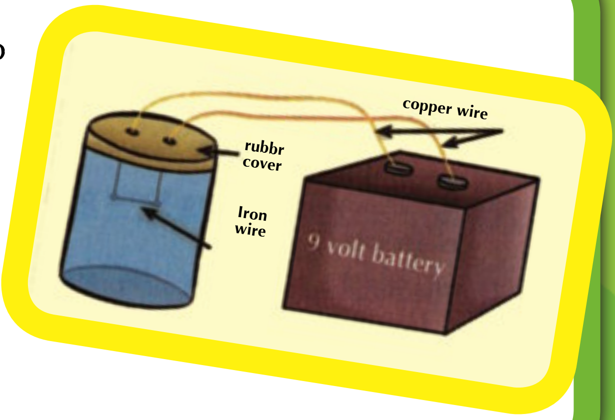
Aspects of health

- Discuss the following topics with the school physician:

  1. The dangers of electricity on the human body.
  2. The uses of electricity and its dangers.
  3. The danger of inhaling mercury vapor in the fluorescent lamp when it breaks.

Building models

- Build a model of the electric lamp as shown in the figure and that is by passing two wires made of copper through a rubber cover. Then bend the ends of the wires and place an iron wire in it. Then place the rubber cover inside a glass, and connect the two copper wires with a battery of 9 volts in strength.



The efforts scients

- Write a research sheet on the attempts of the scientist Thomas Alpha Edison in inventing the electric lamp and its importance in our present time.

Technological applications

- Use some pictures from the internet about the dangers of electricity to make a presentation using the computer to show the dangers of electricity and the means to deal with it.

Unit (2) Test

1 Complete the following sentances:

a .... and .... are two ways for connecting electricity.

b .... and .... are some precautions should be taken while dealing with the electricity.

c The simple electric circuit consists of .... , ... , ... and ....

d .... , ... and .... are examples of the electric insulating materials.

e In the case of connecting the lamps in .... the lighting of the lamps decreases with their increase in number.

2 Correct the underlined in the following sentences:

a The electric lamp converts the electric energy to the <u>kinetic</u> energy.

b The filament of the light bulb is made of <u>carbon</u>.

c While connecting the lamps in <u>parallel</u>, the lamps are connected one after the other.

d There are two connecting points at each end of the <u>light bulb</u> ends.

e <u>The elelctric fire</u> occurs due to the passage of the elelctric current through the human body.

f The electric lamp are connected in the house in <u>series.</u>

g The lamps in the electric circuit continue to work when connected <u>in series</u> if a lamp is damaged.

h The glass bulb of the electric lamp contains <u>hydrogen gas</u>.

i <u>Wood</u> is considered a good conductor of electricity.

3 Write the scientific explanation to each of the following:

a The swelling of the electric lamp contains an inert gas instead of air.

b Not placing metal things inside the socket.

c There are connecting point at the ends of the fluorescent lamps.

d Not placing flammable materials too close to the electric machines that generate heat.

4 **Compare between each of the following:**

a. Connecting electric lamps in series and connecting in parallel.

b. The light bulbs and the fluorescent lamp in respect to structure.

c. The conducting materials of electricity and the non-conducting materials.

5 **Write the term of each of the following:**

a. Materials allowing the electric current passing through it.

b. Fires occur due to the increase in the temperature of the electric wires.

c. Materials not allowing the electric current passing through it.

d. The way that the electric lamps are connected one after another, and the intensity of the light of the lamps decrease with the increase in their number.

e. The way to convert the electric energy to light energy.

f. The way that the lamps are connected through branching routes and the light of the lamps are not affected with the increase in their number.

g. One of the dangers of the electricity occurs due to the passage of the electric current through the human body.

h. One of the dangers of the electricity is that it destroys the tissue of the body.

6 **Write your own paragraph on each of the folloing:**

a. The electric shock.

b. The electric fires.

c. The electric lamp.

d. The precautions that should be taken to deal with the electricity.

Unit 3

The Universe

Unit Objectives

By the end of this lesson, you should be able to:

- Identify the phenomenon of the solar eclipse.
- Do activities to explain types of eclipses.
- Identify safety precautions on observing a solar eclipse.
- Identify the phenomenon of the lunar eclipse.
- Do activities to explain types of lunar eclipses.
- Compare solar eclipse and lunar eclipse.
- Identify some devices to observe space.

Unit introduction

The universe consists of galaxies which contain stars and planets. These galaxies move away from each other in the universe with great speed,so the universe does not have a certain size and it expands as a huge balloon and the distances between its components are geeat and measured in light year units.

* What can yon see in this picture?
* Record your observation.
* Share in discussion with you classmates and your teacher.

Lesson One

The solar eclipse

Lesson Two

The lunar eclipse

Lesson Three

Observing space

UNIT 3

Lesson One (3 -1)

The solar eclipse

Objectives

By the end of this lesson, you should be able to:

- **Identify the phenomenon of the solar eclipse.**
- **Do activities to explain types of eclipses.**
- **Identify safety precautions on observing a solar eclipse.**

Basic concepts

- **Total solar eclipse**
- **Partial solar eclipse**
- **Annular solar eclipse**
- **Cone shadow**
- **Penumbra**

We all know the shadow of trees and its importance to man. It hides the direct sun rays and so we feel a moderate temperature or when we use the umbrella on a summer's day.

Light spreads in the shape of straight lines as long as nothing prevents its path. If a dark object like the tree or the umbrella gets in the way, a shadow is formed of this object.

This also happens when the moon passes between the Earth and the sun on one straight line. It hides the sunlight from us and a shadow of the moon is formed. This phenomenon is called the solar eclipse.

The solar eclipse phenomenon

The moon revolves around the earth in a specific orbit. The Earth revolves with its moon in a specific orbit around the sun. As a result, an astronomical phenomenon occurs known as **the solar eclipse**.

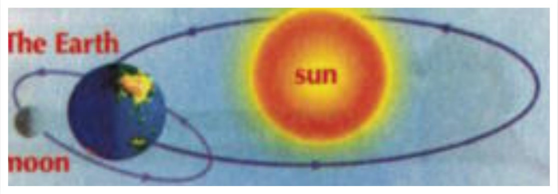


Fig (3-1): The moon revolves around Earth and they both revolve around the sun.

This phenomenon occurs when the earth, the moon and the sun are nearly on one straight line with the moon in the middle. The moon casts its shadow on the earth hiding the sunlight from a part of the earth.

If we are in a suitable place to see the solar eclipse, we will see the dark circle of the moon pass the lighted circle of the sun.

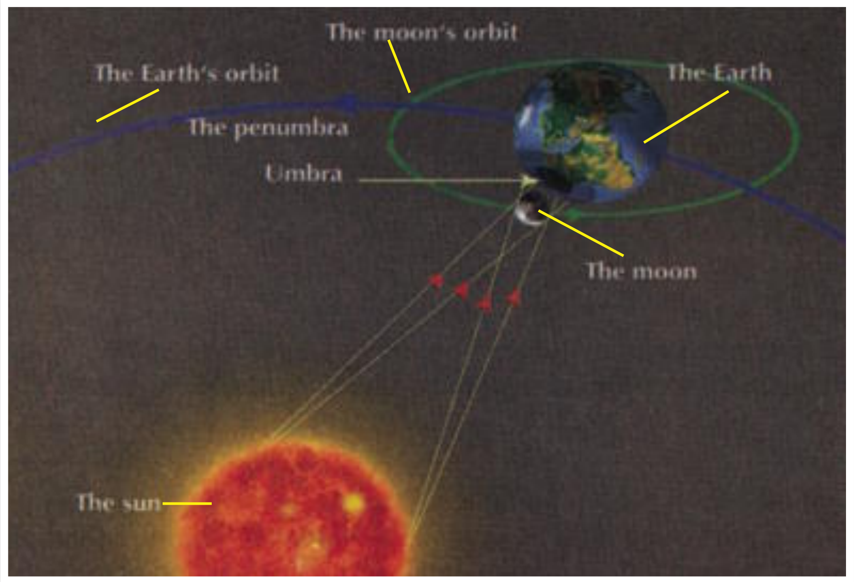


Fig (3-2): The solar eclipse occurs when the moon is located between the Earth and the sun on one stright line.

How does the solar eclipse occur?.

In order to identify how the solar eclipse occurs when the moon comes in between the sun and Earth in different positions; do the following activities on how objects' umbra and penumbra are formed when they come in the way of the light rays.

The solar eclipse

Activity

How is the cone shadow and semi-shadow of a dark object like the moon formed?

What do you need? A big light source (a lamp), a screen, a tennis ball, a ball's holder.

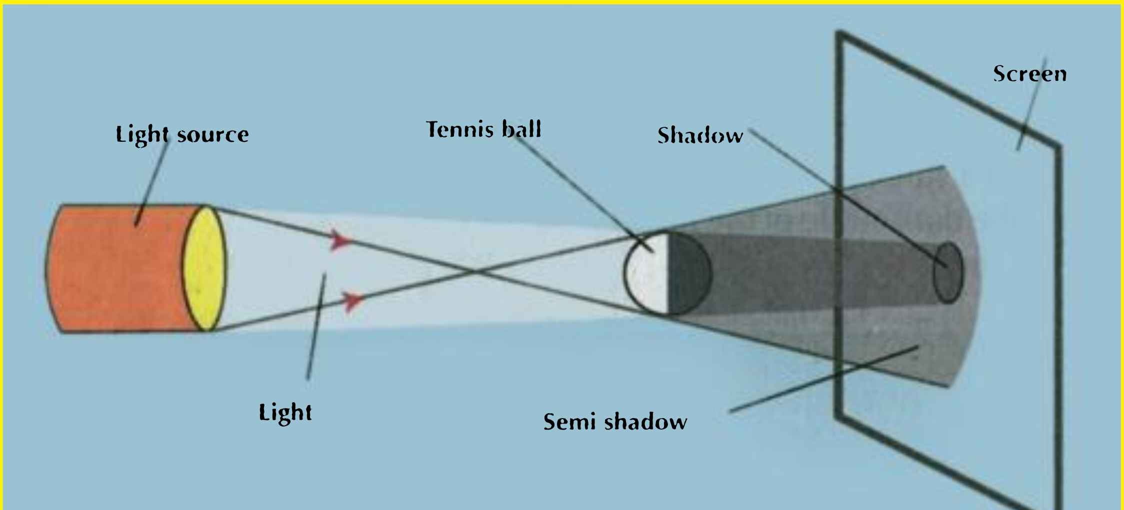


Fig (3-3): *Object's shadow and semi-shadow*

What should you do?

- Put a tennis ball between light source and screen.
- Move the ball toward and away of screen until shadow area is formed.
- Repeat the previous activity steps but use a bigger light source in a way that emits a beam. Notice the occurring change. Record and explain your remarks:

  ....

  ....

- If the light source is bigger (as the sun, lamps,…etc), an area of a semi-shadow appears on the screen between the lighted area and the real shadow area. If we stand in the semi-shadow area and look in the direction of the light source, we will see a part of it.

Activity

How does solar eclipse occur ?

What do you need? Photos of the moon, the sun and the earth, a paper board, a sticker, pens, a metric ruler.

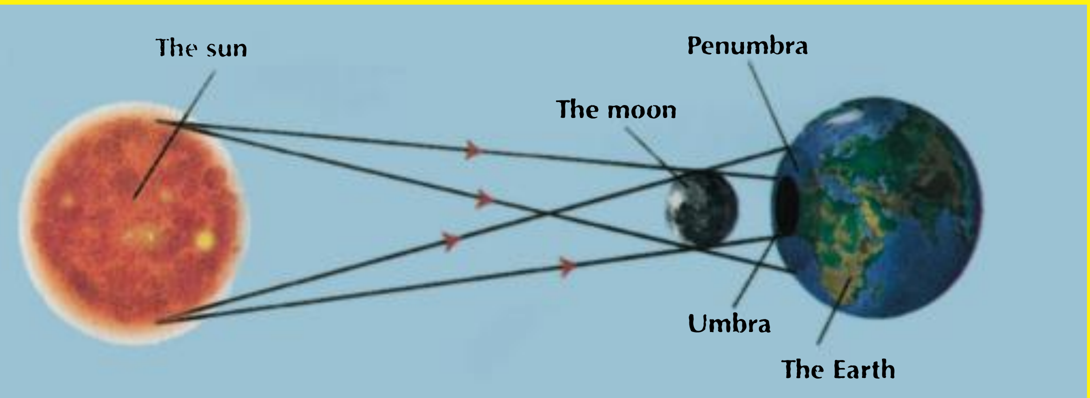


Fig (3-4): *This poition represents the solar eclipse phenomenon as shown in prrvious activity.*

What should you do?

- Draw a diagram that illustrates the previous activity on a paper board as shown in figure (3-4).
- Replace the lamp used in the previous activity with the sun's photo and stick it in its place on the board. Do the same to the tennis ball with the moon's photo and the same to the screen with Earth's photo
- Why can't we see the sun completely in the shaded area while we can see a part of it in the semi-shaded area? ....
....
....

The solar eclipse

Activity

Observe, describe and conclude types of solar eclipse

- Although the solar eclipse is a phenomenon that does not last more than seven minutes and fourty seconds, we can observe more than one type of solar eclipses occuring during the moon's passage in front of the sun's circle and the part of the sun that it hides from Earth.
- Examine figure (3-5) and describe the phases of the moon's trip in front of the sun. Conclude types of solar eclipses that occur as a result of this.

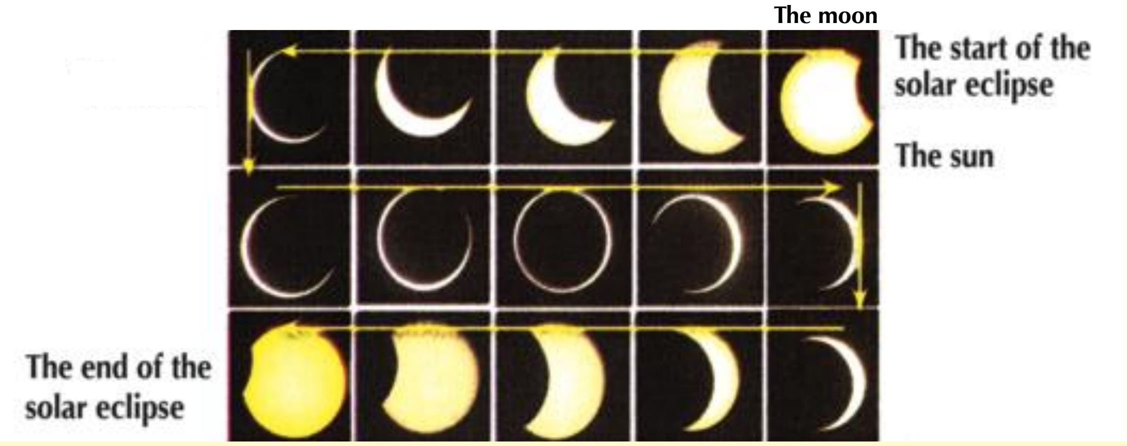


Fig (3-5): *Differences in the type of the solar eclipse with the moon's movement in front of the sun.*

The total solar eclipse is formed in the shadow area of the moon on the Earth (a 250 km radius) in which we can not see the sun completely.

Fig (3-6): *Total solar eclipse.*

In the semi-shaded area of the moon, we can see a part of the sun forming what is known as the partial solar eclipse.

Fig (3-7): *partial solar eclipse.*

When the moon comes in an orbit higher from Earth as it revolves around it in an oval orbit, the cone shadow does not reach the Earth's surface. So, annular solar eclipse is formed.

Fig (3-8): *annular solar eclipse.*

Safety precautions on observing the solar eclipse:

Doctors warn of direct observation of the sun as its rays harm the eye and it can lead to blindness within a few minutes.

Although the sun glow in the solar eclipse is weak so as to focus looking directly at the sun, it affects the eye in general or the retina. This is because the outer solar corona keeps on emitting a harmful ray to the eye like ultraviolet (UV) ray and the infrared ray. Thus, special glasses are used to observe the solar eclipse.

Fig (3-9): *We should not look directly at the sunlight.*

Do you know ?

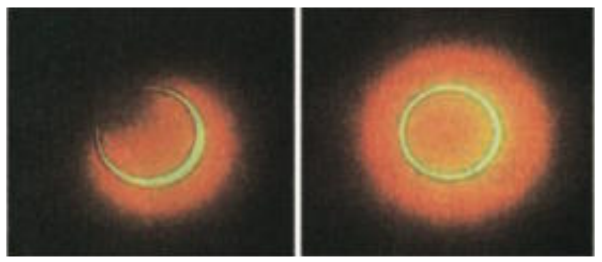
Ancient people from the Babylon age managed to identify the occurrence times of both solar and lunar eclipses tentatively for periods that may last for two yeas in advance.

Think and calculate

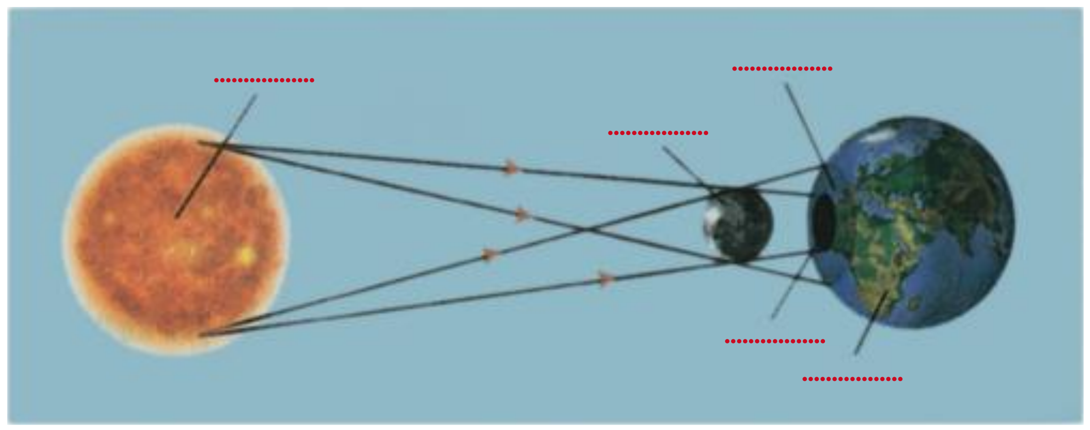
The last solar eclipse that occurred in the Middle East and North Africa was on Wednesday 29th march, 2006.
We have to wait until August, 2027 to be able to see it again
What is the time needed for the solar eclipse phase to occur at our region again?

Exercises

❶ **Notice the two cases of the solar eclipse in the opposite figure: identify their types and explain the reasons for their ccurrences:**



❷ **Notice the following figure: write the labels on the drawing and explain the reason for the occurrence of the solar eclipse.**



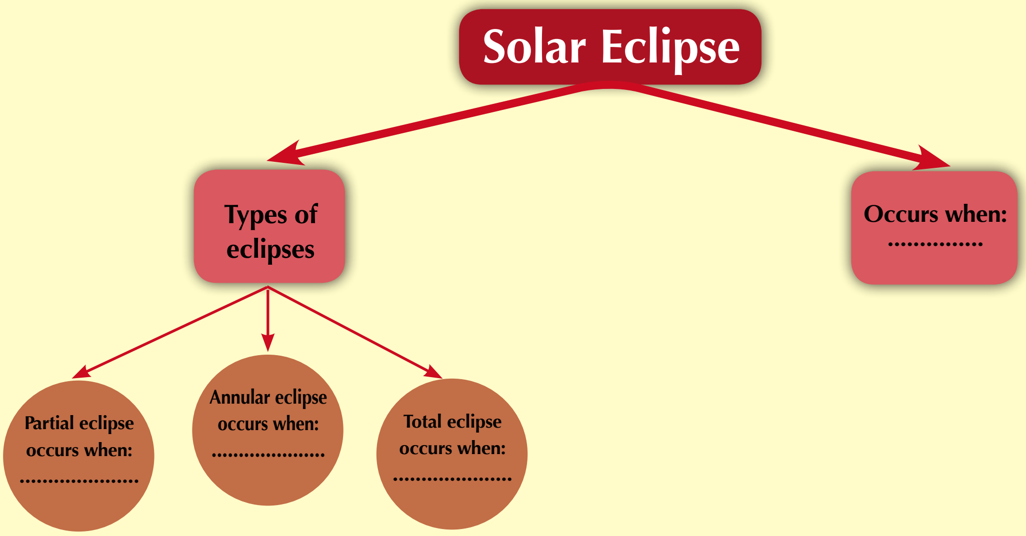
❸ **Justify:**

a We should not look directly at the sun with the naked eye.

b An annular eclipse occurs when the moon comes in an orbit higher Earth.

c The type of solar eclipse differs according to the movement of the moon in front of the sun.

❹ Notice the following figure and determine when each eclipse occurs:



UNIT 3

Lesson Twe (3 -2)

The lunar eclipse

Objectives

By the end of this lesson, you should be able to:

- Identify the phenomenon of the lunar eclipse.
- Do activities to explain types of eclipses.
- Compare solar eclipse and lunar eclipse.

Basic concepts

- Lunar eclipse
- Types of lunar eclipse
- Total lunar eclipse
- Partial lunar eclipse
- Cone shadow
- Penumbra (semi-shadow)

Lunar eclipse occurs when the sun, Earth and the moon are on one straight line and Earth is in the middle. Consequently, the moon enters in Earth's shadow which hides the sun ray from it.

A lunar eclipse can be easily seen from the surface of Earth. It lasts for an hour or two as the surface of the moon gets colored gradually with red and then returns to its original natural color.

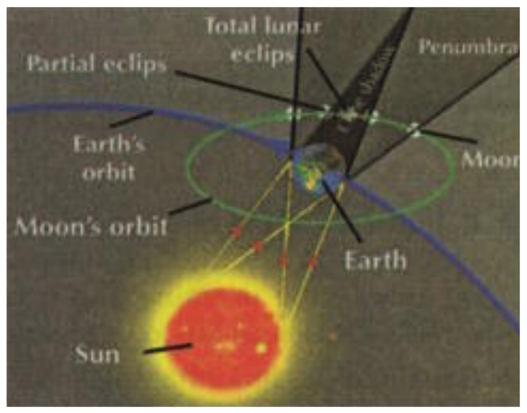


Fig (3-10): *Lunar eclipse occures when the earth hides the sunlight or apart of it from the moon*

The lunar eclipse phenomenon

The phenomenon of the lunar eclipse occurs in the middle of the lunar month when Earth hides the sunlight or a part of it from the moon at a rate of two lunar eclipses per year.

Activity

How does lunar eclipse occur?

- **What do you need?** A source of light (a torch), a coin.

- **What should you do?**
  - Hold the coin between your two fingers and focus the light of the torch on it.
  - Look at the coin in the direction of the source of light.
  - Move the coin gradually in a way that it cuts the light ray gradually. Describe how the coin hides a part or most of the light until it gets out from the other side.
  - Imagine that the source of light (the torch) represents the sun and the coin represents Earth and you represent the moon. In the light of this and with the use of figure (3-11), explain how the lunar eclipse occurs?. ....
  ....

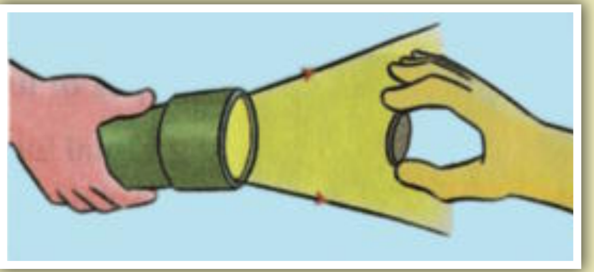


Fig (3-11): *A representation of the solar eclipse*

★ ***When the Earth comes between the moon and the sun and they are all on one straight line, the shadow of the Earth falls on the moon; an act which hides the sunlight from it. In this way, the lunar eclipse is total. The lunar eclipse becomes partial if a part of the moon falls in the penumra area.***

The lunar eclipse

Activity

Observe, describe and calculate

Notice the opposite figure:

- It illustrates a part of lunar eclipse phases on 21st February, 2008. It started at three o'clock in the morning and it ended at three o'clock and fifty one minutes:
- Calculate the time that this lunar eclipse took: ....
- Describe and determine types of lunar eclipse that the figure illustrates: ....

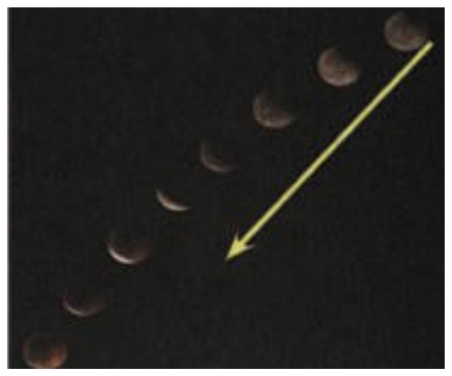


Fig (3-12): *Phases of Lunar eclipse*

Fig (3-13): *Total lunar eclipse.*

Fig (3-14): *Partial lunar eclipse.*

Types of lunar eclipse:

1 Total lunar eclipse:

Total lunar eclipse occurs when the whole moon enters the shadow area of Earth. In this case. a total lunar eclipse occurs.

The sun, the Earth and the moon are on a straight line with the Earth is in the middle.

In the start of the total lunar eclipse, the color of the moon tends to be red due to the red ray that can not be absorbed from above the atmosphere to the earth.

2 Partial lunar eclipse:

It occurs when a part of the moon enters the shadow area of the Earth. In this case, a partial lunar eclipse occurs.

But when the moon enters the semishadad area only, the moon light turns to be faint without being eclipse.

Fig (3-15): *Moon in the semishaded area*

Activity

Compare between solar eclipse and lunar eclipse

- **Nitice the two following figure:**
  - Determine aspects of similarities and differences between the two phenomena of solar and lunar eclipses:

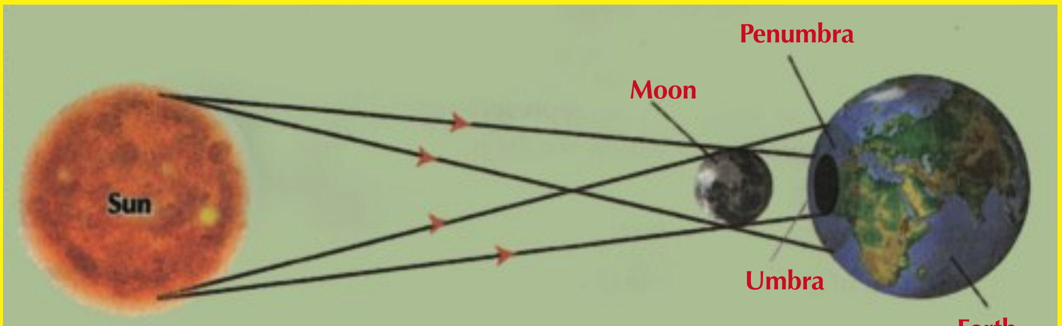


Fig (3-16): *Solar ecipse*

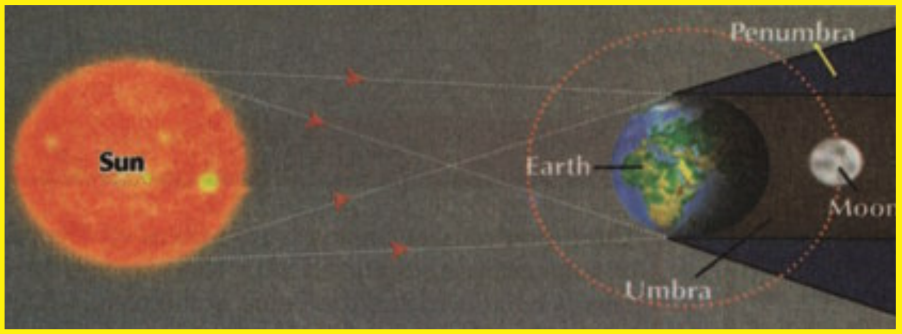


Fig (3-17): *The Lunar ecipse phenomenon*

- **Aspects of similarities:** ....
- **Aspects of differences:** ....

The lunar eclipse

By comparing the two phenomena of the solar and lunar eclipses, we notice that:

1. Lunar eclipse occurs when the Earth comes between the moon and the sun on one straight line whereas solar eclipse occurs when the moon comes between the Earth and the sun on one straight line.
2. Lunar eclipse differs from solar eclipse in that it can be seen from any place on Earth when the sun is behind the horizon at night whereas solar eclipse always occurs in the morning.
3. Lunar eclipse does not require precautions, warnings or special devices to look at it as in the case of the solar eclipse. This is because the lunar eclipse does not cause any harm to the eye when looking at it whereas the solar eclipse can cause serious harms to the eye on looking directly at it.
4. Each of the lunar or solar eclipses represents an astronomical phenomenon which results in the hiding of all or part of each of the sun or the moon from the Earth's population for a period of time.
5. The duration of the solar eclipse does nor exceed seven minutes and a few seconds whereas the duration of the lunar eclipse may last for more than two hours.

Fig (3-18): *Solar eclipse.*

Fig (3-19): *Lunar eclipse.*

Do you know?

The lunar eclipse phenomenon occurs in the middle of the lunar month when the Earh hides the sunlight or a part of it from the moon at a rate of two lunar eclipses per year. The only time in which the lunar eclipse occurred three times was in 1982.

Exercises

❶ **Compare between the two phenomena of lunar and solar eclipses.**

❷ **Put a (✔) or a (✘) in front of each staterments giving a reason:**

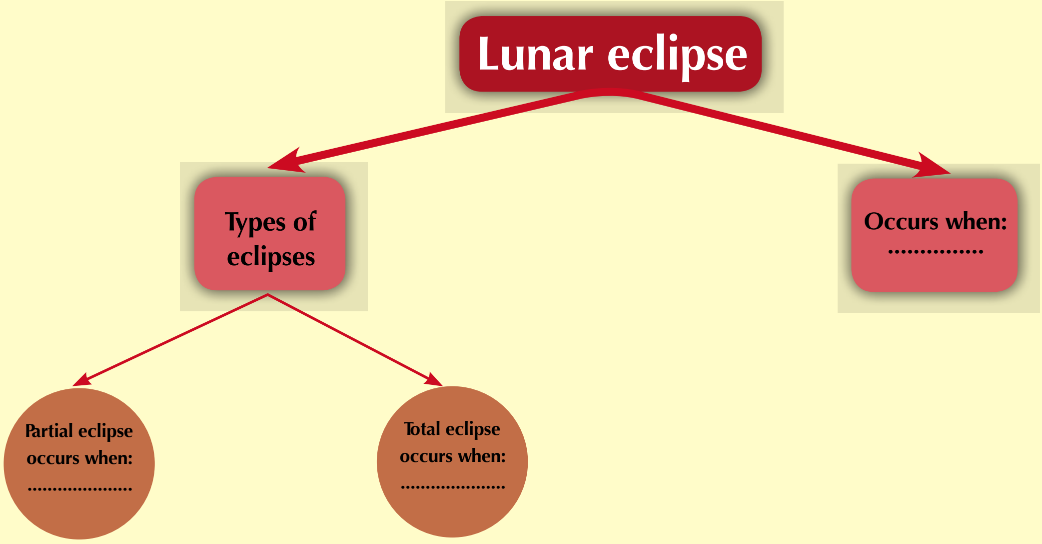
a Although the two phenomena of lunar and solar eclipses attract people's attention, they do not affect life on Earth. (   ).

b The two phenomena of lunar and solar eclipses are repeated regularly and can be predicted (   ).

❸ **Draw a diagram that illustrates the lunar eclipse.**

❹ **Why is not an annular lunar eclipse formed like the solar eclips?.**

❺ **Examine the following figure and determine when does the lunar eclipse occur.**



UNIT 3

Lesson Three (3-3)

Observing space

Objectives

By the end of this lesson, you should be able to:

- **Identify some equipments like telescopes used to observe space.**
- **Identify the role of modern technology like satellites in exploring space.**
- **Appreciate scientists efforts in exploring space.**

Basic concepts

- Space
- Telescope
- Planets
- Stars
- Galaxies

Have you ever looked carefully at the sky in the evening? While you were monitoring the light of the stars, what did you observe?

We use our eyes to simply stare at the stars but we can not use them to know more how stars really look like. To clearly see the stars and know more about them, we need to look through a device called a telescope.

The telescope is a device that collects light to see distant planets and stars clearly (it forms magnified photos of celestial bodies).

❖The Hubble telescope

Space monitoring is an ancient human activity

Since the past, man has been observing the stars and planets. He managed to develop some accurate calculations for their movements in space. For example, the Babylonians discovered in ancient ages that the moon returns back to the same point where the lunar or solar eclipses occurred after 18 years and 11 days.

Fig (3-20): *Man in the past observed the lunar eclipse due to accurate calculations.*

Arab scientists established astronomical observatories on high places like mountains to monitor the movement of planets and stars. They made equipment to monitor the path of the sun, the moon and planets as well as assign the stars locations and study their states.

The Arab scientist Al Hassan Ibn Elhaitham proved that vision occurs due to the amount of light reflected or emitted from objects on the eye.

Fig (3-21): *an astronomical telescope in which lenses are used.*

Based on this theory, scientists came up with the idea of inventing a device that collects the greater amount of light emitted from the distant stars of reflected from the planets in the universe. This device was called the telescope.

The telescope is a device used to see distant objects. Some telescopes are used to see objects on the Earth's surface. Others are used to see calestial objects like the stars and planets and this type is called the astronomical telescope.

The scientist Galileo is the first one who made an astronomical telescope by himself in 1609. He was also the first one who managed to see the mountains of the moon through a telescope.

Fig (3-22): *Galileo was the first one who made a telescope.*

Observing space

Fig (3-23): *A modern telescope*

Modern telescopes

At the beginning, telescopes were made from lenses like Galileo's telescope.

There are various types of telescopes in terms of the type of ray such as the visual light ray, infrared ray or ultraviolet ray they receive.

Places where astronomers work and where telescopes are kept are called observatories. Their ceilings are domes that are opened at night to expose and direct the telescope towards any part of the sky.

Activity

Think and discuss

- **Where do you think is the right place for observatories? over high mountions or in valleys? and why** ....

....

Fig (3-24): *The Hubble telescope.*

Observing space outside the earth:

Man has recently managed to place telescopes revolving around the Earth on satellites and space stations outside the Earth's atmosphere.

The most famous of these telescopes is the "Hubble telescope" that revolves around the Earth in an orbit of 593 km higher than the surface of the sea. This telescope was launched in a space shuttle in 1990 after ten years of design and building it. Its length reaches 16 meters.

Some telescopes work on collecting light and the rest on electromagnetic waves using lenses. Others collect light using mirrors. The Hubble telescope uses mirrors.

Do you know?

It is expected that the Hubble telescope will be expired by 2014 after 24 years of being operated. It provided us with the best photos of Earth and space since 1990. The new James Webb telescope will replace it.

Hubble telescop will fall to Earth in one of its oceans for its final destination.

Activity

Think and discuss

- **What is the special advantage of plaacing telescopes in space than on the earth's surface?** ....

....

....

Satellites are a fixed window at space

Revolving satellites are astronomical observatories that study stars and galaxies from their location outside Earth's atmosphere. In 1957, the first satellite was successfully launched (Sputnik) in an orbit around the Earth.

Since then, several satellites and space stations were launched in orbits around the Earth. They regularly send their photos about the Earth and the spacious universe.

Fig (3-25): *Observing space outside the Earth*

Observing space

Fig (3-26): *The Milky way contains the solar system*

What do we see if we look at the outer space using telescopes?

1 Galaxies:

They are groups of millions of stars forming beams of light in the middle of extreme darkness in space. Galaxies differ in their shapes.

We live in a galaxy called the Milky Way. It has a spiral shape and four arms. It is so huge that it contains more than two hundred billion stars and group systems including the solar system to which our planet Earth belongs (notice the postition of the sun star and the solar system on one of the Milky Way's arms).

Fig (3-27): *The sun and planets of the solar system*

2 Solar system

The sun and the solar system's planets and moons are the nearest object to see in the sky.

Through observation, planets can be classified into two types:

- Small rock planets: the group includes Mercury, Venus, Earth and Mars.
- Huge and of gaseous nature: this group includes Jupiter, Saturn, Uranus and Neptune.

Do you know?

* 1 billion = 1000 million

Exercises

1 Give reasons:

a) Since the past, Man was concerned with observing stars and planets.

b) In the past, exploring the Arab month's crescent was through climbing on top of mountains and minarets.

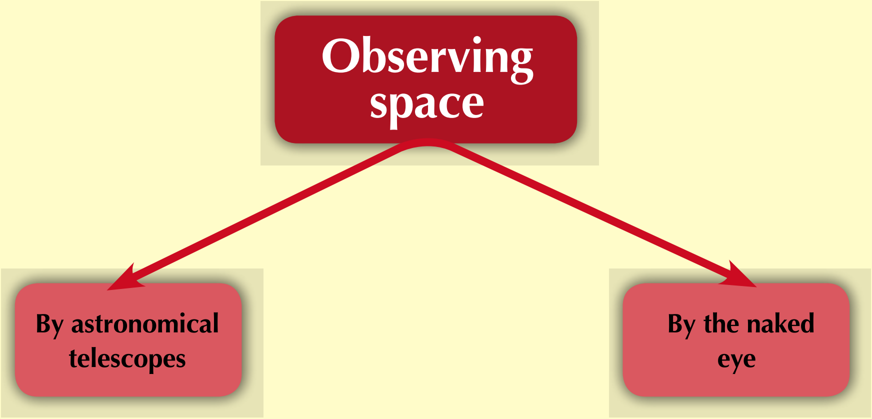
c) Exploring distant space requires placing astonomical obsevatories outside the Earth's atmosphere.

2 Explain the following statements:

a) Space monitoring and exploration got improved due to the development in maaking telescopes.

b) The Arabs have a great history in space monitoring and exploration.

3 Identify the following concepts and express each one using your own words.



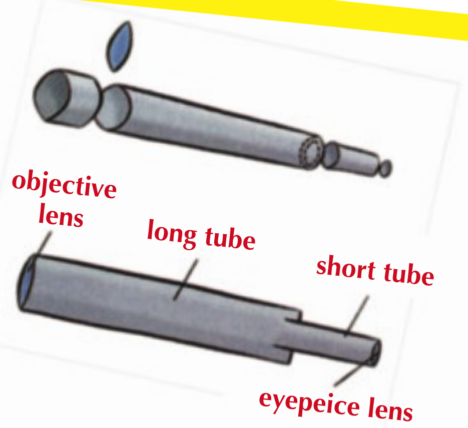
Apply what you have learnt

Build a model "how to make telescope"

- With the help of your colleagues, you can make a telescope that magnifies 30 or 50 times and can distinguish some details of the surface of the moon.

What do you need?

- A convex lens whose radius is 5 cm, focal length is 100 cm and a smaller lens with a focal length of 2.5 cm.
- A plastic tube (like the one sold at the plumber's) whose length is 90 cm and internal radius is 5 cm.
- A shorter tube whose length is 15 cm and a smaller radius (it will slide inside the first tube).

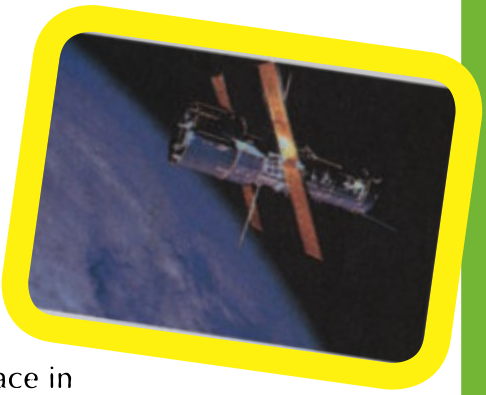


What should you do?

- Fix the first lens (objective) at one end of the longer tube.
- Fix the other lens (eyepeice) in the shorter tube.
- Insert the shorter tube in the longer one move the shortes tube inside and outside to get a clear picture. The strength of magnifying this simple telescope can be calculated through the following simple equation:

- Focus length of the objective lens ÷ focus lens of the eyepeice lens
  100 ÷ 2.5 = 40 times.
- Although this telescope will suffer for "color deviation", it will be useful. You will see the sky just as Galileo.

Scientific application on space monitoring



- The Hubble telescope is the first to revolve around Earth. It provided astronomers with the clearest and best photos ever taken of the universe. This is after their long sufferings from land telescopes which had a lot of obstacles standing in the way of their clarity. These obstacles are like Earth's atmosphere which is filled with dust that affects the monitoring accuracy.
- The Hubble telescope was launched into space in 1990 and it was named after the astronomer Edwin Hubble.
- The Hubble telescope is located outside the Earth's atmosphere at a distance of 593 kilometers above the surface of the sea. It makes a full rotation around the Earth between 99 and 97 minutes.

Healthy applications

- We should not look directly at the sun by the naked eye, but use a telescope or special glasses whether during a solar eclipse or at any time. This is because these devices work on collecting light; an act which results in the damage of the retina. It is recommended to use special glasses.
- To monitor the solar eclipse safely.

- Make a hole in a carton box from one side only provided that the hole should be very small by using the point of a pencil so that it allows the fall of sunlight.
- Direct the hole of the box towards the sun and look inside the box so that the eclipsed sun appears to you.
- Warning: never to look at the sun by the naked eye.

Unit (3) Test

1 Justify:

a We should not look at the sun by the naked eye.

b The type of the solar eclipse differs due to the movement of the moon in front of the sun.

c No annular lunar eclipse is formed like the annular solar eclipse.

d Placing telescopes in space rather than on the Earth's surface is recommended.

e Nowadays, Man spreads space stations and sends satellites outside the Earth.

f We can not see the sun completely during the total solar eclipse.

2 Complete the following sentences:

a The .... phenomenon occurs continuously when the .... hides the sunlight during its pass in front of it from a part of the earth.

b .... occurs when the .... comes between the sun ray and a part or whole of the moon.

c Places where astronomers work and where .... are kept inside are called ....

d A .... solar eclipse is formed when the moon is located in an orbit higher than the earth.

3 Put a (✔) in front of the correct statements and a (✖) in of the false ones and correct the false:

a Since the past, man has been observing the stars and planets. He managed to develop some accurate calculations of their movement in space. ( )

b In 1609, the scientist Faraday was the first one who made an astronomical telescope by himself. ( )

c On the contrary of the solar eclipse, the lunar eclipse can be easily seen from the surface of the Earth by the naked eye. ( )

d More than one type of solar eclipse can be observed. ( )

4 **Define the following terms:**

a Cone umbra.

b The penumbra.

c Total solar eclipse.

d Partial solar eclipse.

e Annular solar eclipse.

f Total lunar eclipse.

5 **Compare between each of the following:**

a Solar and lunar eclipses.

b Total solar eclipse and annular solar eclipse.

c Observing space from the Earth's surface and from outside the Earth.

6 **Mention the term:**

a A device that collects light to observe distant stars and planets clearly.

b It occurs to the moon when it completely enters the shadow area of the Earth.

c It occurs when the moon enters the semi-shadow area only.

d It occurs when the earth comes between the moon and the sun on one straight line.

7 **Explain the importance of observing space using modern telescopes.**

Unit 4

Structure and Function of Living Organisms

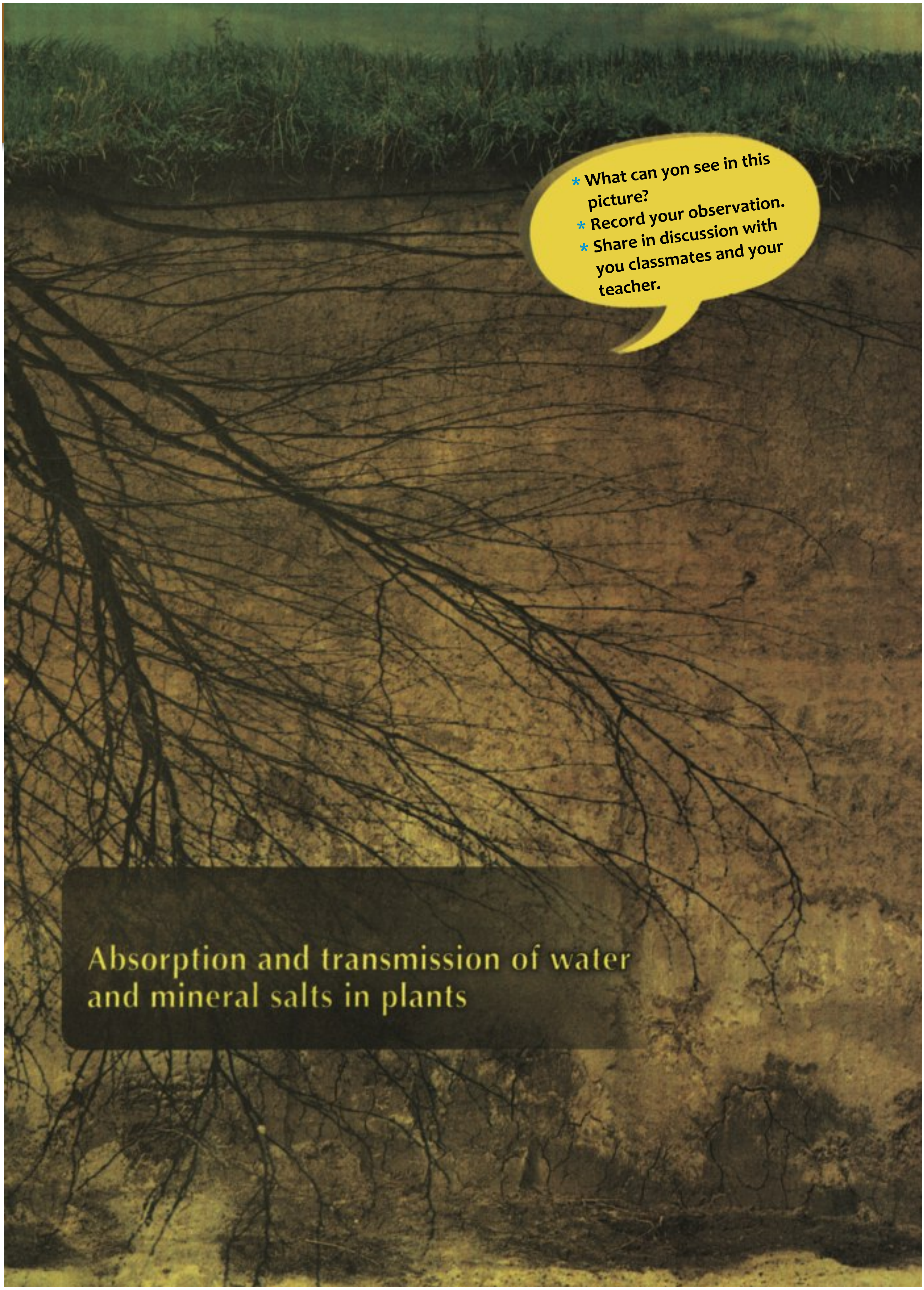
Unit Objectives

By the end of this lesson, you should be able to:

- Identify the role of root hairs in absorption of water and mineral salts from the soil.
- Identify the transmission of water and dissolved substances in plants.
- Identify the transpiration process in plants.

Unit introduction

Plants perfarms photosynthesis process in which it requires water, cabon dioxide and sunlight. This unit explains how the plant gets water and necessary mineral salts and the way they raise to different parts of plants. It also explains plants responses to light, water and gravity.



Absorption and transmission of water and mineral salts in plants

UNIT 4

Absorption and transmission of water and mineral salts in plants

Objectives

By the end of this lesson, you should be able to:

- **Identify the role of root hairs in absorption of water and mineral salts from the soil.**
- **Identify the transmission of water and dissolved substances in plants.**
- **Carry out experiment to identify the transpiration process in plant.**

Basic concepts

- **Root system.**
- **Root hair.**
- **The role of root hair in absorption of water and mineral salts.**
- **Osmosis**
- **Transpirtion process.**

Green plants depends on raw materials in their environment to form its food. they take carbon dioxide from the air and water and mineral salts from soil. Through these simple materials and with the presence of light, plant forms its food by the photosynthesis process.

In addition to the mentioned elements, plants need very little amounts of other elements such as phosphorus, magnesium, calcium, nitrogen, zinc.... and others. These elements also are essential for plant's life.

The absorption of water and mineral salts from the soil occurs through root hairs in the roots.

Fig (4-1): *Green plants depend on raw materials in the environment for their nuture.*

Activity

What is the structure of plant root?

What do you need? Planter containing implanted plant and equipped slide to a cross section of plant root.

What should you do?

- Remove plant from planter in order to extract the root from the soil.
- What do you notice on the roots? ....
- Examine an equipped slide to a cross section of plant root and identify its parts and how the root hairs extend from it.

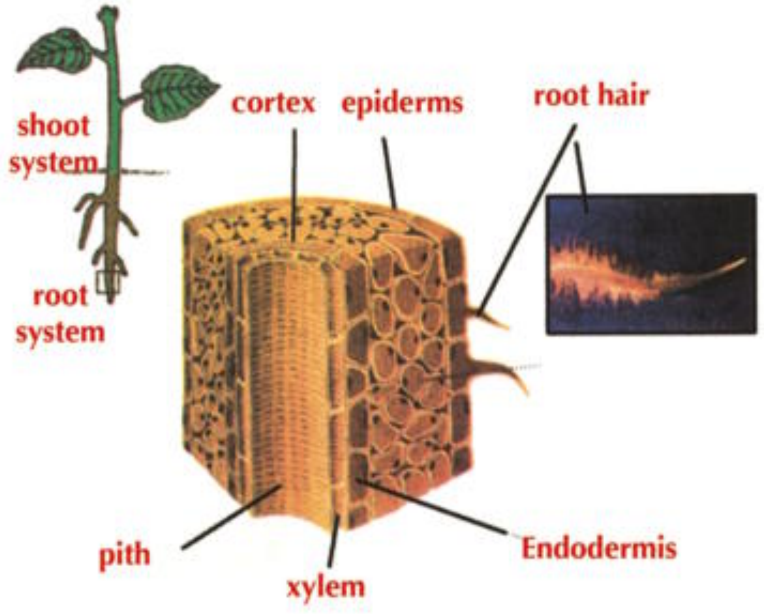


Fig (4-2): *Cross section of a plant root.*

Write your observations ....

★ ***The root system in plant is subdivided and extended throught the soil particles to:***

1. Fixing the plant in the soil.
2. Covering a large area of soil in order to search for water and mineral salts which plant needs, absorbs and raises them to other parts of the plant (shoot system) to from its food.

- Root hair extend from the root and are lined from inside with a thin layer of cytoplasm and have a big vacuole. The age of a root capillary does not exceed a few days because the epidermal cells are lost from time to time by the resistance of soil particles during the expansion of the root, These roots are replaced continuously.

Absorption and transmission of water and mineral salts in plants

Enriching information

What do we mean by Osmosis

Osmosis is the transmission of water molecules through a semi-permeable membrane from an area with a high concentration of water to an area of a low concentration of water.

The role of root hair and their appropriateness in absorption of water and mineral salts:

1. It has a thin membrane that allows the penetration of water and salts through it.
2. It has a large number and extension outside the root which increases the area of the absorption surface.
3. The concentration of the solution inside its vacuole is larger than the concentration of soil solution (area with a high concentration of water) which helps in water transmission from the soil to it by the osmosis feature.
4. Root hair secretes a sticky substance that helps in root penetration through soil particles so that it draws water to work as water membrane facilitating the absorption process.

Activity

The rise of juice from the root to other parts of the plant

What do you need? A test tube small-flowered plant, cotton, eosin solution, metal stand.

What should you do?

- Fill the test tube with eosin solution.
- Remove a small- flowered plant with its root from the planter.
- Submerge the plant roots in the eosin solution then plug the tube nozzle with a piece of cotton.
- Keep the tube in a vertical position by the metal stand for several hours.
- What do you notice about the color of leaf petioles roots and flowers petals? ....

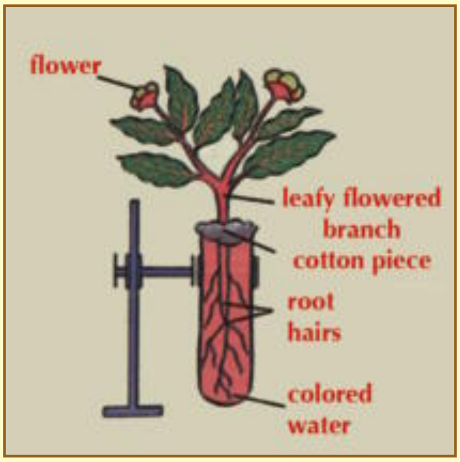


Fig (4-3): ***Why are plant leaves colored with red?***

- When you do a cross section of this plant stem by a blade and examine it by a microscope or a magnifying lens, what are your observations about the color of the internal parts of the stem?.. .

★ *Root hair in the epiderms of the root absorbs water from soil. This is because the salt concentration inside vacuole is larger than salt concentration inside soil. So, water flows from the soil into the root hair through its semi-permeable membrane by osmosis. Then, it moves through root cells which contain a composition of cells called endodermis which regulates water crossing into a tissue called* **Xylem** *where the juice is raised to reach the stem and other parts of the plant.*

★ *As for mineral salts, the cell membrane also has the* selective permeability. *It allows only some salts to pass through according to the plant's needs. This process needs energy that it obtains from the respiration process.*

Activity

What is meant by the process of transpiration?

◉ **Participate with your colleagues in doing this activity.**

◉ **What do you need?** Bell-jar, growing plant in a planter, a glass board, vaseline, fabric.

◉ **What should you do?**

- Cover the soil and the planter with a fabric coated in vaseline. Tie tightly around the base in order to prevent water loss from soil and planter walls.
- Put the planter under the bell-jar and over the glass board.
- Leave the plant for several hours.

Fig (4–4): ***Observe the formation of water drops on the inside of bell-jar.***

◉ **What do you notice?**

- Do you see water drops formed on the inner walls of the bell? ....
- What is the source of these water drops? ....
- What is your explanation for that? ....

★ ***From the previous activity you notice:*** *The condensation of water droplets on the inner surface of the bell-jar. This is due to the vital process of the plants called the process of transpiration.*

Absorption and transmission of water and mineral salts in plants

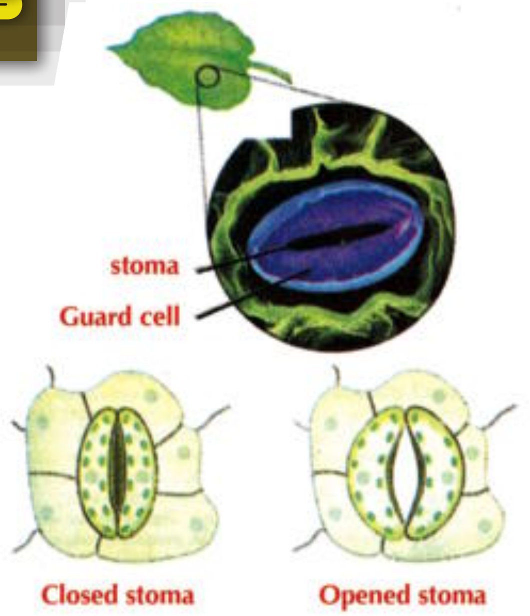


Fig (4-5): *A stoma through which plants lose water vapor*

What is meant by the process of transpiration?

Transpiration is the losing of water in the shape of water vapor from the leaves or from other green parts to its surroundings through holes in the plant leaves called "**stomata**".

- There are many holes or so-called stomata widespread on the lower surface of the plant leaves. Through them, the plant loses most of the water arriving from the leaves. This loss occurs mainly and spreads on leaves surroundings through the stomata.
- Notice figure (4 – 5), check the structure of the stoma when it is opened and when it is closed.
- Each stoma is surrounded by two guard cells. Each cell changes its shape to open and close the stoma.

Activity

Discover water emergence from leaves during transpiration

Procedures

- Bring a leafy potted plant, then put one of its leaves inside transparnt sac and close it tightly.
- Leave the experiment in sunlight for several hours.
- Record your observations ....

Fig (4–6): *A leafy potted plant*

Explain:

- From where the water drops formed inside the sac?

Interpretation

- The plant loses some of its water through holes in the plant leaves called " stomata" in process called " transpiration.

★*When the plant loses water, this creates pressure (a pulling force) that raises water to the top. This force is the result of transpiration*

Notice the following figure to identify how water and dissolved salts transport to all plant parts?

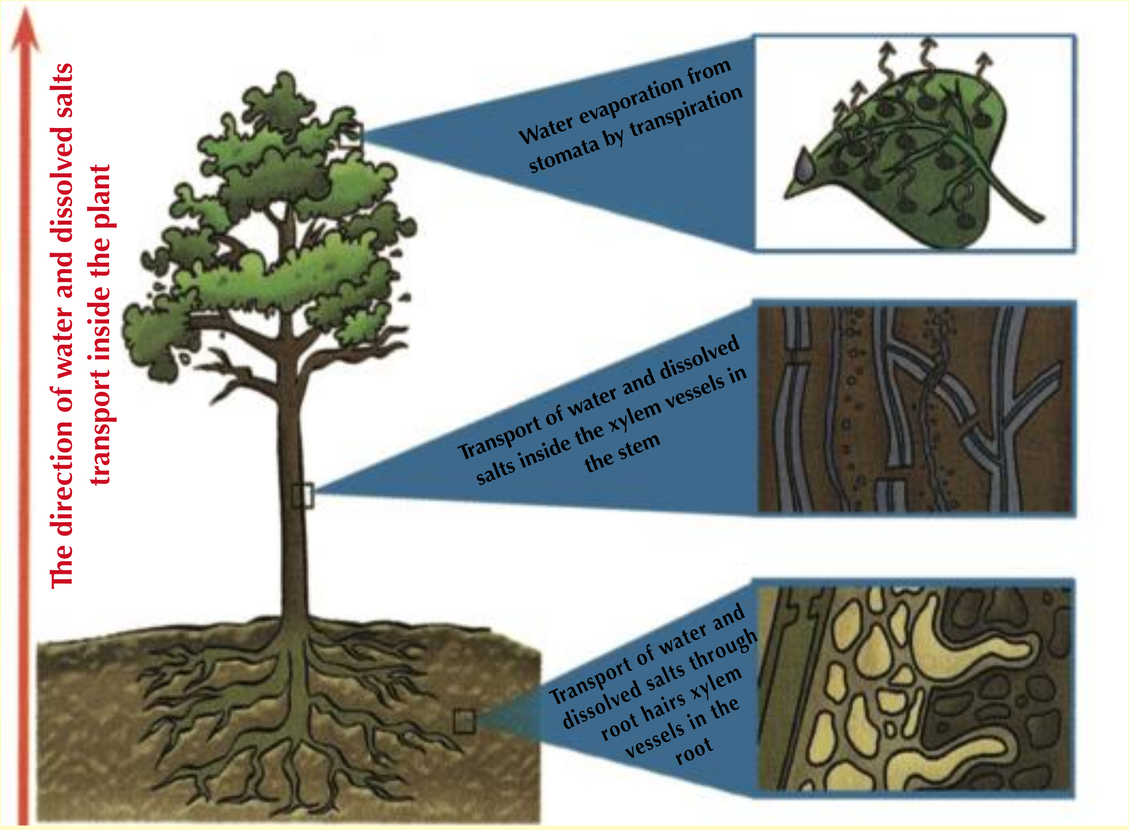


Fig (3-7): *How the water and salts substance transmit to all plant parts*

Exercises

1 Choose the correct answer:

a. Stomata are wide spreading on:

1. Stem   2. Leaf upper surface   3. Leaf lower surface

b. Root hair absorbs most water by:

1. Imbibition   2. Osmosis   3. Selecive Permeability

c. Root hair has a ....age.

1. Short   2. Average   3. Long

d. Plant loses water in form of water vapor in ....

1. Photosynthesis   2. Transpiration   3. Evaporation

e. Root hair wall is ....

1. Thick   2. Thin   3. Average

2 Write the scientific concept of each following statements:

a. Transmission of water molecules through a semi-permeable membrane from an area with a high concentration of water to an area with a low concentration of water.

b. A structure extends from root wall which absorbs water.

c. Biological process throught which plants lose water in the form of vapor.

d. Structure in plant, water passes through it from root to stem to leaves.

e. Two cells surround the stoma in the plant leaves.

3 **Re-write the following sentences after Correcting the underlined words:**

a. Respiration process contributes in water and dissolved substances transmission to top of the plant.

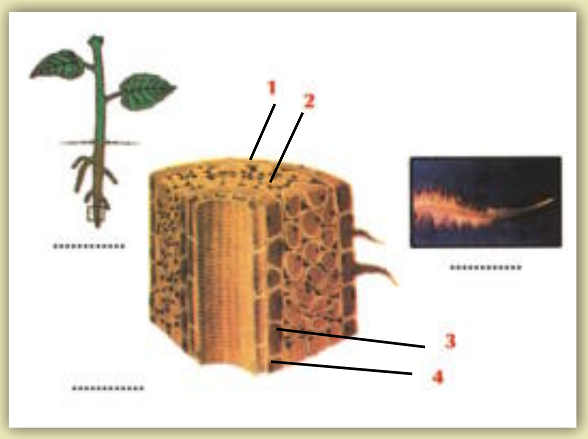
b. Stem extends and penetrates in the soil to increase the absorption surface.

c. Root hairs secrete solid substances which help in water absorbation.

d. Plant loses water in the form of water vapor in photosynthesis.

e. Plant stomata are surrounded by two woody cells.

4 **Identify the following figure, write the data on the figure:**



Apply what you have learnt

Building models

- Use simple environmental raw materials from the surrounding environment (colored pens - plastic plant - cardboard - thread - cork - flexible wire - clay...) to build a model of the absorption of water and minerals by the root hairs and the rise of the juice through the plant parts referring to the path way of this juice by arrows and data, then view your model in the Science lab or school library.

Designing experiments

- Design an experiment that illustrates transpiration as you studied. You can do this at home using a box of cardboard and growing plant in a planter and transparent plastic bag.
  Write a simple comment about your observations and view your production to your teacher and your classmates.

Research activity

- During this unit, you have studied the absorption of water and minerals by the root hairs from the soil, and its rising to the rest of plant parts. Write a research of two pages on that supporting it with suitable illustrations and data. You can use the school library and the internet. Attach your research to your portfolio.

Environmental balance

- You have learnt that plants perform a vital process known as transpiration in which plants lose water in a form of vapor. The vapor spreads out in the surrounding environment to participate in the water cycle in the nature and keep the environment balanced. Discuss this topic in an essay to make a speech in your school broadcast to show the importance of transpiration for living things.

Unit (4) Test

Unit (4) Test

1 Choose the correct answer:

a Stomata are wide spreading on:

1 the lower surface of the leaf 2 Stem 3 root

b Root hair wall is ....

1 Thick 2 solid 3 thin

c Transpiration is a bioprocess where the plant is .... water

1 absorbing. 2 imbibing 3 losing

2 Mention the scientific concept of the following statements:

a Plant loses water in the form of water vapor.

b Transmission of water molecules through a semi-permeable from area with a high concentration of water to another with a low concentration of water.

c A structure extends from plant skin absorbs water.

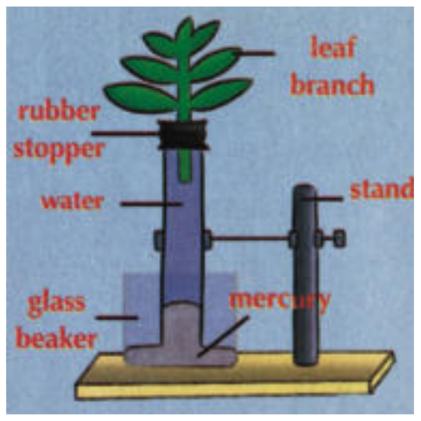
d Two cells surround the plant stomata.

3 Put (✔) in front of correct statements and (✖) in front of wrong statements in each of the following and correct the wrong one:

a Stem extends and penetrates in the soil to increase the absorption surface (   ).

b Plant loses water in form of water vapor in photosynthesis (   ).

c Plant roots are surrounded by two guard cells. (   ).



4 The following figure represents an experiment you have made during your studies. Which of the following you will notice after several days of experiment start?

a Mercury level will reduce.

b Mercury level will rise.

c Mercury level will remain the same.

5 What is meant by each of the following:

a Transpiratio.

b Osmosis.

General Exercises on the second term

First Exercise

1- Choose the correct answer

1- The 1st class lever differs that of the 2nd class lever in:

a) The absence of the acted force.

b) The presence of fixed point to rest on.

c) The position of the fulcrum.

2- Lunar eclipse occurs ....

a) in the end of the lunar month

b) in the middle of the lunar month two times a year

c) in the binging of the lunar month

3- Which of the following is a 2nd class lever?

a) Sweet holder   b) Wheel barrow.   c) See-saw

4- The force is between the resistance and fulcrum in ....

a) nutcrackers   b) scissors   c) sweet holder

5- Transpiration is ....

a) Loses water in the form of water vapor from the plant

b) Transmission of water molecules through a semi-permeable membrane from area with a high concentration of water to another with a low concentration of water.

c) The absorption of water through the walls of the plant.

6- Which gas of the following gases is found in the florescent lamp but not in the electric bulb.

a) Neon   b) Argon   c) Mercury vapor

7-The huge planets of gaseous nature in the solar system are ....

a) Mercury, Venus, Earth and Mars

b) Jupiter, Saturn, Uranus and Neptune

c) Venus, Jupiter, Saturn, and Neptune

8- Tungsten is preferred to use in electric lamps because of ....

a) its low melting point.

b) its bad conductivity .

c) its high melting point

9- When an electric lamp which connected in series with others burns

a) The light intensity decreases.

b) The light intensity increases.

c) All lamps turn off.

10- Solar eclipse occurs when the earth is lined with the moon and the sun and the ....

a) earth is between the moon and the sun

b) moon is between the earth and the sun

c) sun is between earth and the moon.

11- Lunar eclipse occurs when the earth is on straight line with the moon and the sun and the ....

a) earth is between the moon and the sun

b) moon is between the earth and the sun

c) sun is between the earth and the moon

12- The selective property in plants is ....

a) allowing only some salts to pass through according to the plant's needs.

b) loseing of water in the form of water vapor from the plant.

c) absorbing of water from soil.

2-

Force (Newton)	Arm of force (cm)	Resistance (Newton)	Arm of resistance (cm)
X	5	1	10
4	5	2	Y

* From the shown table find

1- The value of the force (X)

2- The value of the arm of the resistance (Y)

3- Give reasons for each of the following:

1- The 3rd class levers are very important in our life although it do not conserve effort.

2- The force does not equal the resistance in the 2nd class lever.

3- The levers are very important to our life.

4- Tungsten is preferred to use in the filament of electric lamps

5- In houses electric lamps are connected in parallel.

6- A metal base is found in the light bulb.

7- In the plant, the root hair secretes a viscous substance.

8- In the plant, the root hair can absorb water from the soil.

9- Presence of holes in the lower surface of plant leaves.

10- The age of a root capillary does not exceed a few days.

11- Each stoma is surrounded by two guard cells.

12- Presence of a cellular membrane in the root hair.

13- Pushing the injured by anything that is non-conducting of electricity such as a piece of wood.

4- What's meant by each of the following:

1- Insulating materials of electricity.

2- Electric fires.

3- Simple electric circuit.

4- Selective permeability.

5- Explain the rise of juice and water to the parts of plants.

6- A 2nd class lever of force 100 Newton its force arm of length is 25 cm, the resistance of 500 Newton calculate the resistance arm.

Second Exercise

First Question:

Write the scientific term which indicates each of the following statements:

1- The substances that allow the electric current to pass through them.

2- The simple machines act as effort saving.

3- The groups of millions of stars forming beams of light in the middle of extreme darkness in the space.

4- Losing of water in the form of water vapour from the plant leaves through tiny holes called stomata.

Second Question:

Choose the correct answer from the following:

1- In the plants, the walls of root hairs are ....
a) thick b) thin c) intermediate

2- From the examples of good electric conductors substances is ....
a) wood b) plastic c) copper

3- .... is considered from the third class levers.
a) Fish hook b) see-saw c) nutcracker

Third Question:

What would happen in each of the following cases:

1- The electric lamps are connected in series in our houses.

2- When the whole moon enters the shadow area of the Earth.

3- When a part of the moon enters the shadow area of the Earth.

Fourth Question:

Put (√) in front of correct statements and (×) in front of wrong statements in each of the following:

1- The electric lamps are connected in parallel in our houses. ( )

2- Plastic is a good conductor of electricity. ( )

3- The third class levers save effort. ( )

4- In the plants, the root hair secretes viscous substances. ( )

5- The glass bulb of the light bulb contains atmospheric air. ( )

Fifth Question:

Give reasons for the following:

1- The filament of the light bulb is made of tungsten.

2- In the light bulb, the inert gas is used instead of atmospheric air.

3- The presence of two guard cells surrounds each stoma in the plant leaf.

4- Avoiding the usage of water in putting off fires resulted from electricity.

Sixth Question:

What is meant by each of the following...... ?

1- Electric shock.

2- Annular solar eclipse.

3- Revolving satellites.

4- Galaxies.

5- Transpiration.

6- Selective permeability.

Third Exercise

First Question:

Complete the following sentences:

1- .... is considered as one of the first simple machines which invented in the past.

2- The lever is a .... that rotates on a fixed point called fulcrum.

3- Scissors are considered as ....class lever, while fish hook is considered as .... class lever.

4- The scientist .... who invented the light bulb.

5- All light bulbs are connected in .... in the house.

6- Fluorescent lamp is filled with an inert .... gas.

7- Metallic materials are considered from the electric ...., while glass and rubber are considered from the electric ....

8- .... happens as a result of passage of the electric current to the human body.

9- Lunar eclipse phenomenon occurs when .... is located between .... and ....

10- Milky way galaxy has a .... shape and .... arms.

11- The root hair secretes .... substance, to help penetrating the root through soil particles.

12- The cellular membrane has .... property which allows only some mineral salts to pass through.

Second Question:

Write the scientific term:

1- Levers in which, the resistance is found between force and fulcrum.

2- Force x its arm = Resistance x its arm.

3- It is a coiled thin wire made of tungsten in the light bulb.

4- They are simple machines used to conserve effort.

5- It is a way of connecting the electric lamps, in which the light intensity decreases with the increase in their number.

6- Materials that don't allow the flow of electricity through them.

7- It occurs when a part of the moon enters the shadow area of the Earth.

8- They are groups of millions of stars forming beams of light in the middle of extreme darkness in the space.

9- It is a device that collects light to see distant stars.

10- They are tiny holes found on both surfaces of plant leaves.

11- It is losing of water in the form of water vapour from the plant leaves through stomata.

Third Question:

Give reasons for:

1- Decorative lamps are connected in parallel not in series.

2- We shouldn't look directly at the Sun with the naked eye.

3- The third class levers always don't conserve effort.

4- The electric circuits are made of electric conductor substances.

5- The electric wires are covered with insulating materials.

6- Avoid operating more than one machine in the same socket.

7- Occurrence of solar eclipse.

8- Special glasses are used to observe the solar eclipse.

9- The observatories have dome shape ceilings that are opened at night.

10- Since the past, Man was concerned with observing stars and planets.

Fourth Question:

Put (√) in front of correct statements and (×) in front of wrong statements in each of the following:

1- The fulcrum of a lever is always between force and resistance. ( )

2- The third class levers always save effort. ( )

3- The fulcrum in scissors lies between force and resistance. ( )

4- If the resistance arm is longer than the effort arm, so the lever saves effort. ( )

5- The spiral base of the light bulb glows due to passing the electric current through it. ( )

6- Electric insulators allow the flow of electric current through them. ( )

7- Electric shock occurs as a result of passage of the electric current to the human body. ( )

8- If the injured with an electric shock can't breathe, start immediately artificial respiration. ( )

9- The swelling of a light bulb contains oxygen gas. ( )

10- Avoid placing flammable materials too close electric machines that generates heat. ( )

11- All light bulbs are connected in parallel in the house. ( )

12- The last solar eclipse that occurred in the Middle East was in 2006 ( )

13- The duration of solar eclipse doesn't exceed seven minutes and few seconds. ( )

14- The concentration of solution inside the root hair's vacuole is higher than the concentration of soil solution. ( )

15- Endodermis cells regulate the passage of water to the xylem. ( )

Fifth Question:

Choose the correct answer:

1- From the first class levers is ....

a) nutcracker. b) sweet holder c) scissors d) manual broom

2- Wheel barrow is considered as ....

a) first class lever b) second class lever

c) third class lever d) a and b

3- Force arm is sometimes equal to resistance arm in .... class levers.

a) first b) second c) third d) first and third

4- The filament of the light bulb is made of ....

a) iron b) copper c) tungsten d) aluminium

5- All the following materials allow the flow of the electric current except ……………………………………..
a) copper b) rubber c) iron d) aluminium

6- It occurs to the moon ………………………
a) total solar eclipse b) total lunar eclipse
c) partial solar eclipse d) a and b

7- Galaxies are groups of millions of ………………………..
a) planets b) moons c) stars d) satellites

8- The stoma in a plant is surrounded by …………………… of guard cell(s).
a) one b) two c) three d) four

9- The number of stomata in the plant is widespread on the …………………
a) root b) stem
c) upper surface of a leaf d) lower surface of a leaf

10- The root hair is characterized with …………………. wall.
a) thick b) flat c) thin d) all the previous

11- Losing water from the plant is called ………………. process.
a) imbibition b) absorption c) transpiration d) osmosis

12- The root hair secretes …………………….. substance which helps in absorbing water.
a) solid b) viscous c) flexible d) smooth

Sixth Question:
Correct the underlined words:

1- Nutcracker is from the first class levers.

2- An active gas is placed inside the electric lamp to increase the lifetime of the filament.

3- The simple electric circuit consists of battery, lamp and an insulator to connect the battery with the lamp.

4- The third class levers always save effort.

5- There are two points of connection from inside on both tips of the lamp.

6- The electric lamp changes electric energy to chemical energy.

7- The human body is good conductor of electricity because it contain gases.

8- Anti-thermal glass is from electric conductor substances.

9- Ancient people was able to identify the times of both solar and lunar eclipses in a certain form before its occurrence by two years.

10- Partial solar eclipse occurs when the cone umbra doesn't reach to the Earth's surface.

11- The scientist Edison is the first one who made an astronomical telescope.

12- The soil secretes sticky substance, which helps in penetrating the root through soil particles.

13- The stoma is surrounded by a guard cell that changes its shape to open and close the stoma.

14- Osmosis is a biological process in which the plant loses water in the form of water vapour.

Seventh Question:

Compare between each one of the following:

1- <u>The levers of the first, second and third classes:</u>
With respect to (definition – save effort).

Points of comparison	First class	Second class	Third class
Definition			
save effort			

2- <u>Connecting electric lamps in series and in parallel:</u>
With respect to (light intensity – removing one of the lamps from the connection).

Points of comparison	Connecting in series	Connecting in parallel
Light intensity of the lamps		
Removing one of the lamps from the connection		

3- Electric conductors and electric insulators:

Electric conductors	Electric insulators

4- Total solar eclipse and total lunar eclipse:

Total solar eclipse	Total lunar eclipse

<u>5- The light bulb and the fluorescent lamp with respect to structure:</u>

Light bulb	Fluorescent lamp

<u>6- Direct injures (first type) and indirect injures (second type):</u>

Direct injures	Indirect injures

7- Umbra area and semi shadow area:

Umbra area	Semi shadow area

Eighth Question:

Choose from column (B) that suits column (A):

1-

(A)	(B)
1- always save effort	a) First class levers
2- always don't save effort	b) Second class levers
3- sometimes save effort	c) Third class levers
4- The point of a rigid bar that rotates on	d) Lever
5- A rigid bar that rotates on the fulcrum and is affected by force and resistance.	e) Force
	f) Resistance
	g) Fulcrum

2-

(A)	(B)
1- Light bulb 2- Connecting electric lamps in the house 3- The filament of the light bulb	a) is in series b) is in parallel c) changes electric energy to light energy d) made of nichrome wire e) made of tungsten wire

3-

(A)	(B)
1- The scientist who invented the astronomical telescope 2- The scientist who invented the light bulb	a) Hubble b) Edison c) Galileo

Ninth Question:

What would happen if:

1- There would not be levers.

2- There is no a discovery for telescopes.

3- The whole moon enters the cone umbra area.

4- The whole Sun enters in the extensions of the cone umbra area.

5- The force arm is longer than the resistance arm.

6- The tungsten filament of the light bulb is replaced with copper.

7- The absence of an inert gas in the light bulb.

8- Electricity is not handled cautiously.

9- Opening the electric circuit by using the electric switch.

10- The electric wires are left uncovered and non insulated.

11- Someone looks to the Sun directly with the naked eye for a long time.

12- The absence of stomata in the plant leaves.

13- The plant carries out transpiration process inside the bell - jer.

14- The absence of guard cells which surround the stoma.

15- There is no osmosis feature in the plant.

16- The root hair doesn't secrete a sticky substance.

17- The concentration of the solution decreases inside the sap vacuole.

18- Placing a tennis ball in front of an electric lamp, once close to it and the other far from it.

19- Putting off the electric fires with water.

Tenth Question:

Write the labels on the following figures:

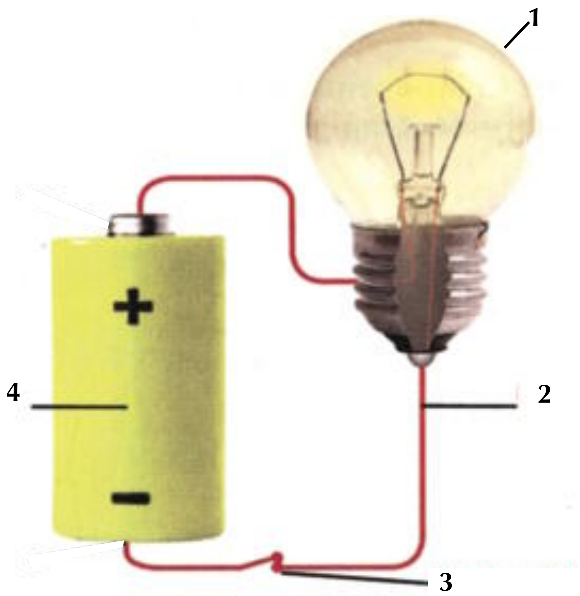
First Question:

1- ………………………..

2- ………………………..

3- ………………………..

4- ………………………..



The simple electric circuit

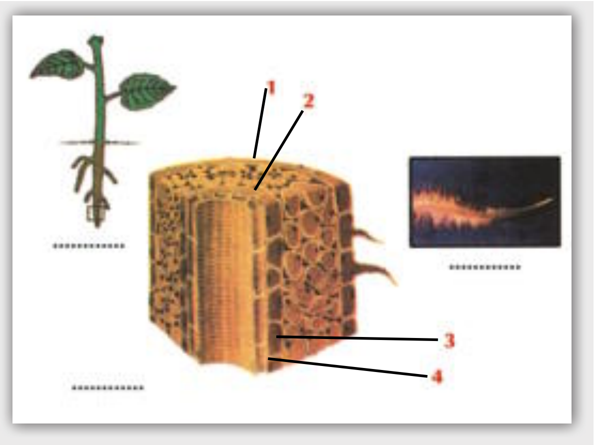
Second figure:

1- ………………………..

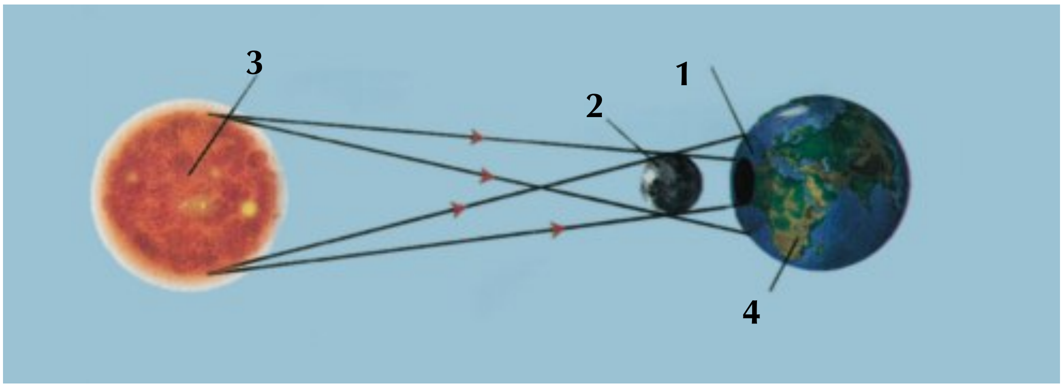
2- ………………………..

3- ………………………..

4- ………………………..



Third figure:



1- …………………………

2- …………………………

3- …………………………

4- …………………………

Eleventh Question:

Problems:

1-Calculate the length of the resistance arm that regains the balance of the lever.
If you know that the length of the force arm is 2 cm, the hanging force is 8 Newton and the resistance is 4 Newton

2- A force of 400 Newton affected on a lever of the first order and its force arm is 20 cm.
Calculate the resistance given that the arm of the resistance = 80 cm

3-If you know that the length of the force arm in one of the levers is 40 cm, the length of the resistance arm is 60 cm
Calculate the value of the resistance that regains the balance of the lever given that the value of the affecting force is 480 Newton.

4- Calculate the length of the force arm in a lever if you know that the value of the force is 400 Newton, the resistance is 200 Newton and the length of the resistance arm is 20 cm.

Second Term
Test (1)

1 Write the scientific term:

a A fixed point on which a solid bar is placed.

b Fires that occur as a result of the increase in the temprature of electric devices.

c The strutures that extend from the root to absorb water.

d The water that the plant loses in the of vapour.

2 Put a (✓) or (✗) in front of each statements and correct the wrong one:

a The phenomenon of solar and lunar eclipse attract peopl's attention because it affects life on Earth. (   ).

b Fires resulted from electricity are extinguished by water. (   ).

c The root system in plants is responsible for photosynthesis process. (   ).

d The crowbar is an example of the first class levers. (   ).

e If the force arm is smaller than the resistance arm, the lever saves effort. (   ).

3 Complete the following sentances:

a The nutcracker is an example of the .... levers.

b The electric shock occurs as a result of the passing of .... through the human body.

c The .... in plant is surrounded by two guard cells.

d Force X its arm = ... X ....

4 **Compare between:**

a) The solar eclipse and the lunar eclipse.

b) Good conductors and insulating materials of electicity.

5 **Give reaasons for the following:**

a) The phenomenon of solar and lunar eclipse is considered an application of the umbre phenomenon.

b) The heater should not be placed in a touching position of textiles and carpets.

c) Force and resistance can be equal in first class levers only.

d) The phenomena of solar and lunar eclipse are regularly repeated and can be predicted.

6 **The affecting force of a first class lever equals 500 Newtons and the length of its arm 20 cm and the resistance of 200 Newtons. Calculate the length of the resistance arm.**

7 **Indentify astronomical phenomenon shown in the following figuer then write the labell.**

Test (2)

Question (1):

Choose the correct answer:-

A) All the following are from the 3rd class lever except ....

1- Wheel barrow. 2- Fish hook.

3- Manual broom. 4- Sweet holder.

b) Groups of millions of stars forming beams of light in the middle of extreme darkness in space and differ in their shapes are called ....

1- Satellites. 2- Galaxies.

3- Solar system. 4- Planets.

c) All the following gases are used in the electric lamps except..........

1- Argon 2 - Neon

3- Xenon 3- atmospheric air

d) When the electric lamp connected in parallel with others the light intensity ....

1- decreases 2- increases

3- vanishes 4- doesn't change

e) Biological process through which plants lose water in the form of vapor is called ....

1- Transpiration 2- selective permeability

3- respiration 4- Osmosis feature.

Question (2)

Give reasons for each of the following;-

1 - The root hairs in the plant are thin walls.

2- Sometimes the 1st class lever saves effort.

3- Argon is used in electric lamps instead of atmospheric air.

4- Water cannot be used to put off the fire resulting from electricity.

5- We must use some instruments to look at the solar eclipse.

Question (3):

a) What happens in each case;-

1- The filament of the electric lamp is made of aluminum.

2- A man touches uncovered wire carrying current.

3- Cellular membrane is not present in root hairs of plants.

b) Mention one function for each of the following:

1- Florescent lamp

2- The telescopes.

Question (4):

a) What's the difference between each of the following:(one point)

1- Total solar eclipse and partial solar eclipse.

2- 3^{rd} class lever and 2^{nd} class lever.

b) What's meant by each of the following :

1- The lever 2- Transpiration 3- Electric shock

Question (5)

Correct the following sentences:

1- **Human body is a bad conductor of electricity.**

2- We can see the sun completely in the partial eclipse.

3- The root hairs absorb water and air from the soil

4- Galaxies are a group of millions of planets.

5- Stomata spread on the upper surface of the plant's leaves.

Test (3)

Question (1):

1) Choose the correct answer:-

a) Which planet is the huge one and has a gaseous nature?

1- Mars. 2- Saturn,

3- Venus 4- Mercury

b) Which lever saves more effort?

1- Scissors 2- Nutcrackers

3- Fish hook 4- Sweat holder

c) Which statement is correct?

1- Solar eclipse takes a time less than that of lunar eclipse.

2- Solar eclipse takes a time more than that of lunar eclipse.

3- Solar eclipse takes a time equals that of lunar eclipse.

4- There is no relation between the time of solar eclipse and that of lunar eclipse.

d) On connecting the electric lamp in series with others

1- The lighting of the bulbs increase.

2- The lighting of the bulbs decrease.

3- The lighting of the bulbs always doubled.

3- The lighting of the bulbs unchanged.

e) All the following are functions for levers except …………..

1- Increasing force 2- Decreasing speed

3-Increasing distance 4- Saving effort

Question (2):

a) Give reasons for each of the following:-

1- In the 2^{nd} class lever the force is always less than the resistance.

2- The presence of two pieces of lead in the electric lamp.

3- The age of a root capillary does not exceed a few days.

4- You mustn't look directly at the sun during solar eclipse.

5- The concentration of the solution inside its vacuole is larger than the concentration of soil solution.

Question (3):

a) What happens in each case of the following?

1- There are no stomata in the plant leaves.

2- The electric lamps contain atmospheric air.

3- Telescopes are not discovered.

b) Mention one function for each of the following:-

1- Stomata in the plant leaves. 2- The 1st class lever.

Question (4):

a) Mention one difference between each of the following:

1- **Total lunar eclipse and partial lunar eclipse.**

2- Connection in series and parallel of electric lamps.

b) What's meant by each of the following:-

1- Fulcrum. 2- Transpiration in the plants.

3- The osmosis feature.

Question (5):

a) Put (√) or (X) in front of each , then correct the wrong one:

1- In the 3rd class levers the arm of force may be equals the resistance arm

2- The electric shock is the result of an electric current passing through the human body.

3- The galaxy (Milk Way) has a circular shape, and nine arms contain more than two hundred million stars.

4- The telescopes work on diverging light comes from far stars.

5- Root hair extend from the root and are lined from inside with a thin **layer of xylem and have a small vacuole.**

Test (4)

1) Choose the correct answer:-

a)…………… is a lever from the 3rd class

1- Sweet holder　　2- Scissors　　3- Nutcracker

b) ………… is a good conductor of electricity?

1- Iron　　2- Plastic　　3- Wood

c) ………… absorb water and mineral salts from the soil.

1- Leaves　　2- Root hairs　　3- Stems

d) .... is the first scientist who was making astronomical telescope.

1- Edison　　2- Galileo　　3- Faraday

(2)Write the scientific term in each of the following:-

a) A way of connection for the electric lamps to decrease the luminous intensity as their number decrease.

b) Losing of water in the form of water vapor from the leaves or from other green parts.

c) They are groups of millions of stars forming beams of light in the middle of extreme darkness in space differ in their shapes.

(3)Put (√) or (X) in front of each and correct the wrong one:-

1- The root capillaries have thick walls. ( )

2- Stomata are wide spreading on the upper surface of leaf. ( )

3- Mercury is a huge planet and of gaseous nature. ( )

4- Looking directly at the lunar eclipse is harmful to the eye. ( )

5- Florescent lamps are called neon lamps because it contains inert gas called neon gas. ( )

6- In the 2^{nd} class lever the resistance is between force and the fulcrum. ( )

(4) Give reasons for each of the following:-

1- Root hair secretes a sticky substance

2- In houses the electric lamps are connected in parallel.

3- The 3^{rd} order lever **does not save effort.**

4- The glass bulb of the electric lamps contains inert gas.

(5) Mention some of the important precautions when deal with electricity.

(6) A force of 50 Newton affected a lever of the 2^{nd} class its force arm 20 cm calculate the resistance given that the arm of the resistance = 5 cm.

(7) Classify the following machines according to their types:

Test (5)

First Question:

Complete the following statements:

1 - In first class levers, the fulcrum is found between .... and ....

2- When the arm of the force is shorter than the arm of the resistance so, ... is larger than .... and thus it doesn't save effort.

3- There are two types of injuries resulting from the improper use of electricity which are .... and ....

4- In the solar eclipse, ... is found between the sun and ....

Second Question:

A- Write the scientific term which indicates the following statements:

1- Type of levers doesn't save effort.

2 - Astronomical phenomenon occurs when the whole moon enters the shadow area of the Earth.

3 - Way used to connect electric lamps in branching routes.

B- Look at the following figure, then write the labels on the figure:

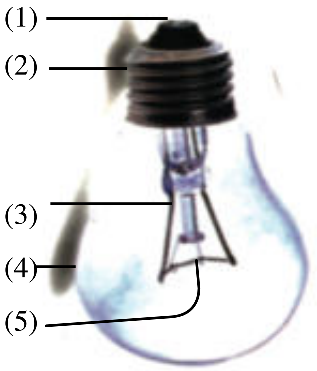
1 -

2-

3-

4-

5-



Light bulb

Third Question:

A- Give reasonson for the following:

1- The presence of stomata on the lower surface of the plant leaves.

2- Annular lunar eclipse doesn't occur.

3- The second class levers save effort.

B- What is meant by each of the following ....?.

1 - The good electric conductor substances.

2- The partial lunar eclipse.

Fourth Question:

A- Put (√) in front of corect statements and (x) in front of wrong statements in each of the following:

1- The nutcracker is considered as a first class lever. (   )

2- The force x its arm = The resistance x its arm. (   )

3- The light bulb is filled with oxygen gas. (   )

4 - The telescope is used in the vision of celestial bodies. (   )

5 - The solar eclipse lasts for a long time. (   )

B- Compare between each of the following:

Solar eclipse and lunar eclips.

C- A force of 200 Newton affected a lever of the 2^{ed} class its force arm 50 cm. If the value of resistance 1000 Newton and the length of the arm of resistance is 10 cm.

Discovered: Is this lever balanced or not? and why?.

Test (6)

First Question:

Complete the following statements:

1- In the second class levers, the resistance is found between …………………….. and ……………………

2- The solar eclipse occurs when ………………………….., ……………………………… and Earth are on one straight line.

3- ….................……………………. is the scientist who makes ………............…………….. which is used in the vision of celestial bodies such as stars and planets.

4- On both surfaces of the most plant leaves, there are tiny holes called …………………………… used in making ……………………….process.

Second Question:

Write the scientific term which indicates the following statements:

1- The levers in which the fulcrum is found between the force and the resistance.

2- The groups of millions of stars forming beams of light in the middle of extreme darkness in the space.

3- A part of the plant that penetrates through the soil particles and fixes it.

4- A tool used to convert electric energy to light energy.

Third Question:

A- Give reasons for the following:

1- The third class levers don’t save effort.

2- The root hair of the plant is able to absorb water from the soil.

3- The electric cables are covered by insulated materials.

B- What is meant by each of the following...... ?

1- Lunar eclipse.

2- Electric shock.

Fourth Question:

A- Put (√) in front of correct statements and (×) in front of wrong statements in each of the following:

1- The astronomical telescope is used in the vision of the distant objects. (   )

2- The phenomenon of solar eclipse occurs when the Earth, moon and the Sun are on one straight line. (   )

3- The root hair of the plant has a long age. (   )

4- The Venus planet is huge and of gaseous nature. (   )

B- A force of 500 Newton affects on a first class lever and its arm of force equals 10cm, the resistance equals 200 Newton and the lenght of the arm of resistance is 20cm.

Discovered: Is this lever balanced or not? and why?.

Good Luck

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بالمواصفات الفنية الآتية

عدد الصفحات : ١٣٢ صفحة

المقاس : ٥٧ × ٨٢ سم

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ألوان الطبع : ٤ لون للداخلى والغلاف

جميع حقوق الطبع محفوظة لوزارة التربية والتعليم
داخل جمهورية مصر العربية

الشروق
الحديثة للطباعة والتغليف
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